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OUTLAND

article by
Don Shay



"When you go and make a film like Outland," observed writer-director Peter Hyams, "you are entering very, very risky waters, because you're following some really good and some really bad movies. And if you're a filmmaker who's serious about his work, you don't want to be compared unfavorably to the good ones." With the highly successful Capricorn One on his brief list of credits, followed by the equally unsuccessful Hanover Street, Peter Hyams had spent time on both sides of the critical fence. Bent upon rekindling the elusive spark of public affection, he began looking to the stars for his subsequent project. "I have two young sons, and they are wonderful litmus tests of movies, as far as whether they are going to be successful or unsuccessful. Not that they're particularly special in that regard. It's just that they're really so prototypical of kids their age. So I started looking at their kind of film — and I didn't have to look far. In fact, I'm thoroughly convinced that about thirty to forty percent of George Lucas' personal worth has been financed by my sons. But it struck me that when you look at Star Wars and a lot of those other movies, you're looking at a very specific view of the future, and a very specific emphasis. And I began to realize that I had a very different view of the future, and ultimately a very different emphasis."

It was the end result of this realization that found its way onto the stages of Pinewood Studios last summer as Outland went before the cameras. In plywood, steel and plastic, a frontier mining colony of the not-too-distant future had been brought into being — on the inhospitable, shifting surface of the Jovian moon Io. "I selected Io primarily because at the time I was sitting down to write this thing, the first photographs of Jupiter were just coming into JPL, and I was absolutely awestruck by them. I was awestruck by the size of Jupiter, and by the violence of it. It's beautiful, really, but in the same way a volcano is beautiful — there's a majesty about it, except it's a formidable and frightening one. It was very important to me that we stay close to earth. I know 450 million miles doesn't sound very close, but it's relatable to us because it's within our solar system. It's not some distant galaxy where we're talking light years. So if it's not exactly close, it's at least within our emotional sphere, and what we're dealing with is the real hard mechanics of how to get to and from places, how you survive once you get there, and what to do with yourself in that kind of an environment. Jupiter, to me, presents a kind of

physical testimony to how insignificant and small we really are, in a very graphic way. For one thing, it's twelve times the diameter of earth, and yet it rotates in nine hours and fifty minutes. The red spot on Jupiter is a storm. Three planet earths could disappear inside that red spot — and it's a storm! So you're really dealing with forces that are almost incomprehensible. And the whole idea of being situated on one of the moons of Jupiter, where the sky overhead is absolutely dominated by this maelstrom of color and violence, struck me as, in itself, a sight that lets us know what we're in for.

"I wanted to make a film about what I thought the future would really be like — where you'd come away believing that you had seen something that was feasible, in attitude as well as execution. For me, I think the future will be very much like the past — that is, a frontier. And frontiers have always been places of great danger and enormous hardship. So *Outland* is my view of that future — the first step. And while it seems to me that most exploration is done by people of certain foresight and courage, the bulk of it is done for very pragmatic reasons. You don't really get into a clipper ship and sail across the ocean, fearing all the while you might fall off the edge, just because you want to expand the horizons of the species. Rather you do it because you hope to find new places you can get things from. If you buy that thesis, then it seemed to me that on a planet faced with terrible fuel problems and terrible resource shortages, the natural thing would be to look at space as yet another place to exploit. So, short of putting up a string of Holiday Inns, I think that what we really want out there is what's in the ground — whatever we can bring back to alleviate our immediate concerns. Okay, if you buy that thesis, then what are we really going to be doing there and what is it going to be like? And again it struck me that rather than being a series of lucite domes and people gliding across conveyor belts, it would instead be not that much different than the digging of the Suez Canal, or the building of the Alaska pipeline, or day-to-day operations right now on off-shore oil rigs. Historically, they seem to be the same kinds of operations, and historically they seem to attract the same kinds of people — opportunists mainly, some perhaps with suspect pasts, who are there to make as much money as they can, as fast as they can."

To Io's sprawling Con-Amalgamate #27 mining complex comes federal District Marshal William T. O'Neil (Sean Connery), a man of integrity if not tact, whose years of interpersonal strife with company superiors have earned him a tour of duty at one of Con-Am's least savory outposts. Although, as an administrator, his wife and child are permitted to accompany him, Con-Am 27 proves to be the final indignity heaped upon his long-suffering spouse, and after only two weeks on station she gives her husband an ultimatum to cast aside his thankless career and leave Io at once, or remain behind without her. By then, however, O'Neil is already embroiled in a situation he can neither leave nor ignore. A bizarre epidemic of irrational suicides has been plaguing the colony for months, and no one in authority seems inclined to be concerned about it. O'Neil traces the cause to a synthetic narcotic being peddled around the outpost surreptitiously, but with the full sanction of the on-scene company manager — and apparently the corporate hierarchy, as well. An amphetamine-type substance, the drug serves the company's interest by increasing worker output. More insidiously, it tends to reduce long-term compensation, since by the time the user's one-year hitch is nearing completion the drug's cumulative effect induces acute psychosis. Ignoring official recommendations to the contrary, O'Neil begins busting lower-

echelon pushers. In reaction, the company manager sends for a team of hired assassins to contain the problem before it escalates out of control. Aware that the next inbound shuttle will deliver his intended killers, O'Neil tries to muster his forces, but in classic High Noon fashion, finds himself standing alone when the shuttle's final appearance turns Con-Am 27 into a virtual battlefield.

image

Writer-director Peter Hyams' grim speculations on future space exploitation form the basis of *Outland*, an adventure-drama set in a deep-space mining colony on the Jovian moon Io.

image

Sean Connery stars as a district lawman whose persistent investigation into a rash of unexplained suicides imperils both his job and his continued existence.



Hyams and production designer Philip Harrison employed a strict functional rationale in devising sets for the Con-Am 27 mining complex. Jail cells were designed as zero-gravity chambers where prisoners free-float harmlessly in pressure suits.

"I spent some time as a reporter with CBS during the Gemini and Apollo days," Hyams continued, "and what really struck me about those missions was how really dangerous it all was. The environment is totally hostile and you're totally dependent upon your life support systems. Well, living and working on *lo* would mean having to cope with that hostility on a day-to-day basis, and that situation alone becomes a principal player in all this. The mining colony is a very tough place — a terrible, dangerous place. It's there for a definite purpose, and it's not at all designed for creature comfort. It's crowded; it's filthy; it's claustrophobic. The ventilating system doesn't work right — it's always too hot or too cold. It's dehumanizing. And clustering that many people — of the temperament that situation would demand — in an area that size, tends to breed a kind of violence. The situation itself makes people volatile. So to me, *Outland* deals with what I think are the realities of the time. It deals with vice; it deals with drugs; it deals with crime; it deals with greed — good old-fashioned values, right? But it also deals with courage, and it deals with honor — the kinds of divergent things that extreme hardship and extraordinary situations seem to foster. But first, last and foremost, it's a story about people — real people faced with a very serious situation. It's a story that could take place in other places — and has taken place in other places. If nothing else, *Outland* will have a unique quality to it in that it's a film set in the future that is not about hardware. In fact, it may well be the first attempt ever in this kind of genre to use the future as a location, rather than the sole subject of the movie."

Hyams spent three months on his first draft screenplay, called *lo* — a title which was to persist through the early days of preproduction until repeated confusion with the rather dissimilar *10* prompted him to change it. To Hyams' surprise, the usually laborious task of shopping a script around Hollywood proved remarkably unfrustrating with *Outland*. In fact, several major studios expressed interest in the project before Hyams ultimately found a home for it with The Ladd Company, whose corporate executives had recently abdicated the top managerial positions at 20th Century-Fox to form an independent organization at The Burbank Studios. *Outland* was to be the first production under their new corporate banner — a factor that weighed heavily in Hyam's decision to go with them, since he was certain that making the picture an unqualified success would be the company's primary and overriding concern. True to his supposition, The Ladd Company became totally obsessive with the project — sending him back to his typewriter for seven more drafts before they were ready to put his screenplay before the cameras.



Living quarters were made overcrowded and penitentiary-like.



And for entertainment, the company leisure club was outfitted to accommodate a variety of unsavory diversions.

Meanwhile, the decision had been made to shoot entirely at Pinewood Studios, a long-standing haven for science fiction producers eager to get every possible dollar onto the screen. Among the first to join the Outland unit was special effects supervisor John Stears. A veteran effects expert with two Academy Awards to his credit (for *Thunderball* and *Star Wars*), Stears was charged with overseeing the complex miniature work and floor effects required for the production. Pledged to join the team later on as optical effects supervisor was Roy Field, who had only recently claimed his own Oscar for *Superman* and was still in the final stages of postproduction on *Superman II*. A third Oscar-winning talent, John Mollo, was hired to design the near-futuristic costumes.

Another early team member was production designer Philip Harrison, with whom Hyams had worked on *Hanover Street*. "The design concept for Outland was a very specific one," said Hyams, "in that it was totally functional. Function dictates design, and clearly the design of such an outer space mining complex would be economically driven — cram in as many workers as humanly possible, give them air to breathe, food to eat, and that's it. So when Philip and I began thrashing ideas around, that was the only criterion we considered. How do you get the largest amount of people in the smallest amount of space?"

image

Studio technicians make final positioning adjustments on the two greenhouses. In all, the miniature Con-Amalgamate #27 mining complex and its accompanying landscape occupied most of an entire stage at Pinewood. The twin spires, containing mechanized elevator shafts which ran down into the subsurface mining area, were significantly shortened prior to actual photography. In keeping with Hyams' desire for a single light source effect, a battery of searchlights and brute arcs flooded the miniature with harsh unidirectional lighting.

Predominant among the resulting set designs were the vast, penitentiary-like living quarters comprised of metallic sleeping cubicles layered from floor to ceiling — harshly-lit and devoid of privacy, with communal showers and locker rooms nearby. Row upon row of protective helmets and pressure suits lined an adjoining accessway to a massive airlock which opened onto the elevator platform leading down into the mine. The mining area itself, dark and claustrophobic, crisscrossed with scaffolding and catwalks, extended more than a mile beneath the surface of the moon. In addition to other futuristic, but more conventional, settings such as the squad room and medical bay, the complex also featured a unique jail consisting of zero-gravity cells in which prisoners free-float in pressure suits connected to umbilical tethers. And for off-duty recreation, workers swarmed to the company leisure club where drinks flowed freely, pickups were plentiful, and nude dancers coupled erotically in glimmering shafts of laser light. Whatever their purpose, from the commonplace to the extraordinary, the Outland sets seem imbued with a gritty realism and functional utility that only a few futuristic predecessors like *Silent Running* and *Alien* had ever been able to capture.

When it came to designing the outside of the complex, Hyams and Harrison endeavored to apply the same sort of functional rationale. Hyams had first envisioned Con-Am 27 as a cluster of geodesic domes, but as preproduction progressed, he became infatuated with the idea of transforming it into something resembling a vast offshore oil rig. Since Io's surface is known to be wracked by severe seismic activity, it was reasoned — perhaps illogically — that by

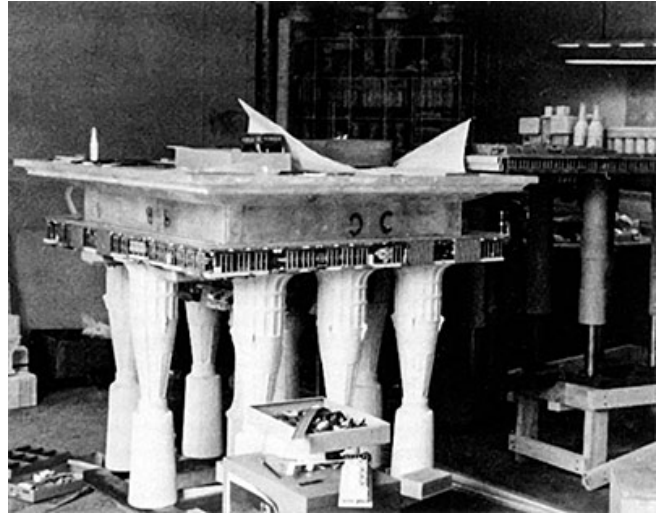
constructing the above-ground facilities on stilt-like legs, each mounted on bearings which shifted in response to signals from laser sensors, the complex could be stabilized at all times.

With a basic design concept for the refinery in hand, Peter Hyams contacted Brian Johnson and Nick Alder about possibly building it. Johnson and Alder, who had most recently filled effects supervisory positions on *Alien* and *The Empire Strikes Back*, recommended Martin Bower and Bill Pearson for the job. Bower and Pearson had only recently formed a partnership under the name Bowerhouse Model Associates. As independents, the two had worked side-by-side on major productions such as *Alien* and *Flash Gordon*, but more often than not found themselves bidding against each other for model-making assignments. The partnership seemed an ideal way to effectively eliminate the competition.

"We went along to the studios," Bill Pearson recalled, "and Peter showed us two artist's impressions of the refinery. There were still a lot of unsolved problems at that time. The biggest one was actually how large the miniature was going to be. Estimates ranged between ten feet long and forty feet long. Peter wanted to know what sort of detail we could get into a miniature, so we took one of the color impressions and decided the best way we could show him how much detail we could get would be to build him one. Well, obviously, we didn't go for the forty-foot one. Instead, we built a section about two-and-a-half foot square — basically a platform with legs on it — and took it in to him. It was really quite a nice model. We even put a motorized radar scanner on it. Peter couldn't believe it. He didn't know we were actually going to build one, and he loved it. He did quite a few film tests on it, and then he told us, 'Okay, we need a miniature, twenty foot long, with the detail that you have there.' And that's how we got into it."

Getting into it was only the start, however. "We had only three months to complete the job, and even at that it was going to be a real push. So we had to make some compromises with the art department. Art departments, in general, just aren't used to model-makers actually designing things. They're used to handing a design to a pattern maker and he does it precisely as they have it drawn. Well, we've worked on enough movies now to know what aspects of a drawing are important to follow and which bits to disregard. If you can get the same aesthetic feeling about a certain section that you're building, that's it. So we do a lot of designing as we go along. We like to add our own creative input, and it really helps us cut corners. Especially on a limited schedule, you've got to cut corners. You can't start milling things and turning stuff on a lathe to thousandths of an inch. It's just never noticed on the screen. The problem on *Outland* was that the art department was not only trying to get together drawings for the miniature, but they were also doing the sets, as well. And of course, to the art department, the sets are really more important. So we decided we couldn't sit around and wait to get our drawings — we'd have never finished in time. As it turned out, we had the first section built before they gave us the drawings for it. Finally, we came to a compromise. They started producing actual-size silhouettes or outlines of the shapes that were required and we filled in all the details. Some of the sections we had to build exactly as specified so they would match other things being built elsewhere. They'd say, 'You can do whatever the hell you want around it, but we must have these units as drawn.' So that's pretty much the way we worked. Somebody from the art department would come out every couple of days and make sure we weren't going too far

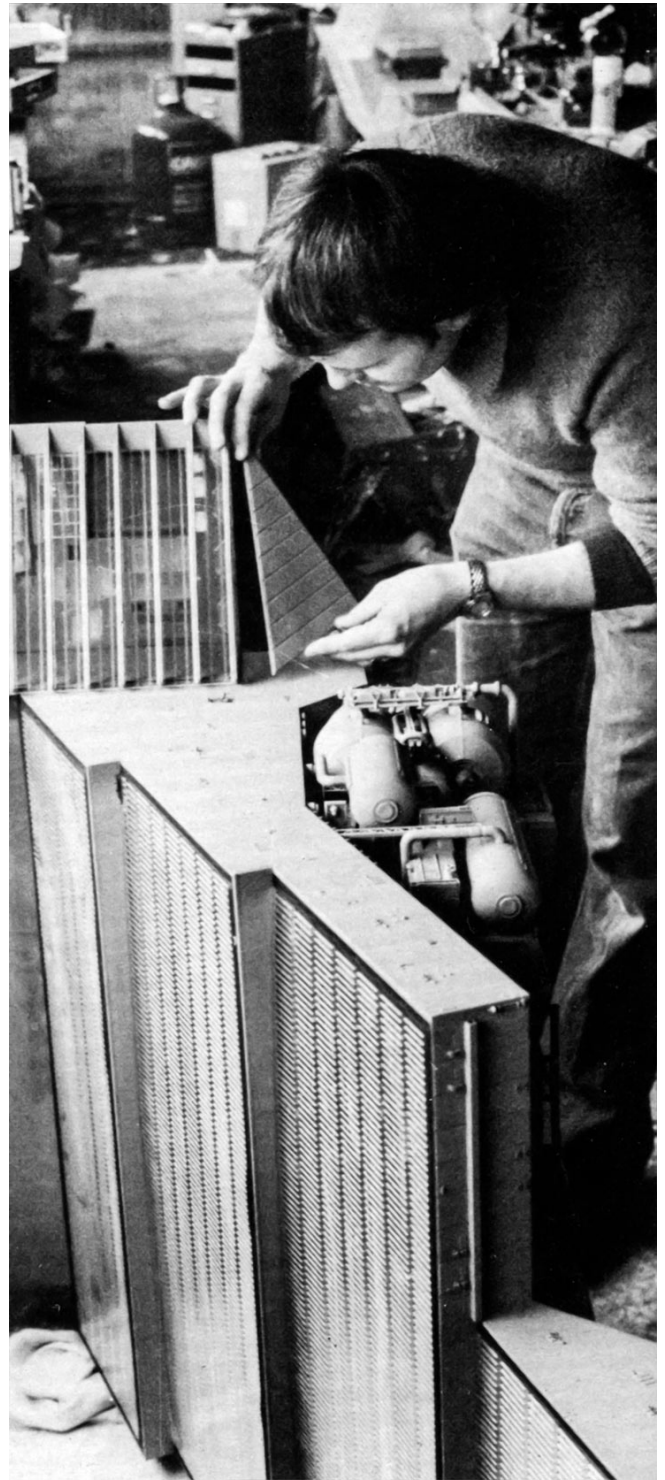
astray. Fortunately we were about forty minutes from the studio or it probably would have been more often.”



The shuttle landing pad — in the midst of final detailing — sits in the Bowerhouse Model Associates workshop. Behind it are the completed refinery and living quarters.

image

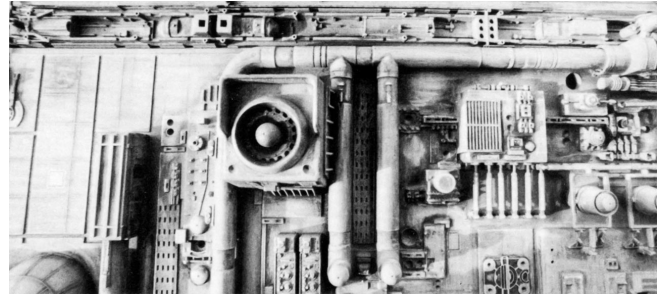
Although most of the Con-Am structures were built by Martin Bower and Bill Pearson, the landing platform was fabricated at Pinewood by effects supervisor John Stears' crew and then sent to Bowerhouse for detailing. Bill Pearson spray-paints the backside of one of the greenhouses. The overall color scheme was later changed to an off-white.



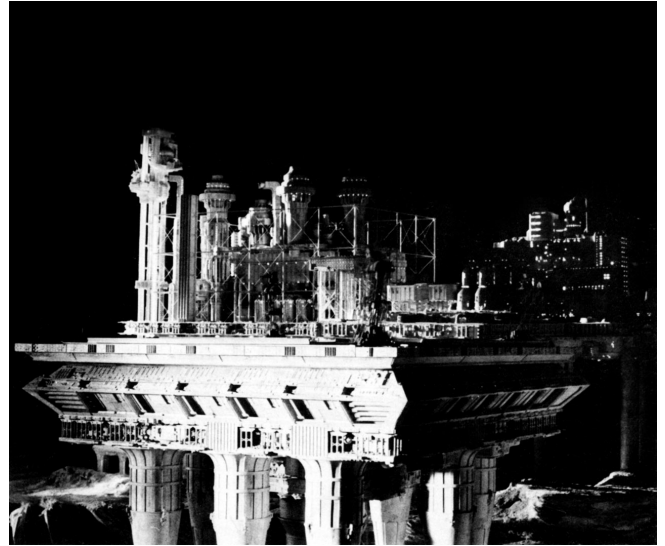
Using chloroform as an adhesive, because of its bonding qualities and lack of residue, Martin Bower carefully affixes a greenhouse side panel.

Con-Amalgamate #27 was comprised of seven interconnected modules, each serving a specified function. The largest was the refinery itself, a spider's web of beams and cables, nicknamed "Pompidou Center" because of its architectural similarity to the controversial Trench museum of the same name, whose structural supports are positioned outside the building rather than inside. Unlike the other sections of the complex which were mounted flat on elevated platforms, the giant Pompidou module actually passed through its platform — which in appearance and function was more like a picture frame — and was suspended by a dozen strategically-placed brass pins. Adjoining the refinery were living quarters for the more than two thousand laborers and administrative personnel required to support the mining operation. Other sections included the mine itself, a solar power generating station, a space shuttle landing pad, and two gigantic greenhouses. Pearson and Bower were tasked with producing all the above-ground structures except for the landing pad. That, and the actual solar panel area of the generating station, were to be built at Pinewood by John Stears and his crew. In fact, the entire model-building operation demanded close cooperation between the two units. "Because we were under such a tight deadline," Pearson revealed, "there were still a lot of question marks by the time we got underway, particularly over the illumination — the type of fiber optics to be used. As a result, Johnny Stears said, 'Well look, if you can build the miniature in sections and then make the sections all come away as much as possible so my boys can get into the back of them, we can fit the fiber optics in when it gets to the studio.' That meant that every section on the refinery had to be detachable, more or less, which did slightly complicate matters, but we managed it okay."

After first measuring their workshop door to be certain they didn't inadvertently produce a section that was too big to get outside, Bower and Pearson set to work on the massive and complex miniature. "We start by manufacturing a lot of standardized units like tanks and pipes and edge detailing. We use injection molding and vacuum-formed sections, brass rods and all kinds of plastic tubing — things like that. That way, as we go through each section, we can incorporate some of these units into each one to give some kind of continuity throughout the model and some sort of architectural correctness — like it's all been manufactured by the same company. Then, after you've got your standard units, it's just a matter of getting in there and



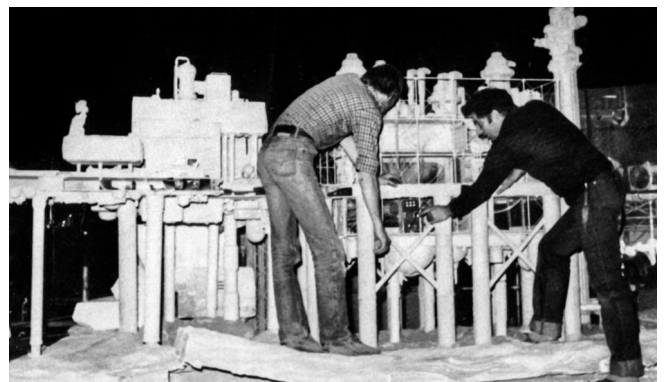
A detail of the unused two-foot prototype.



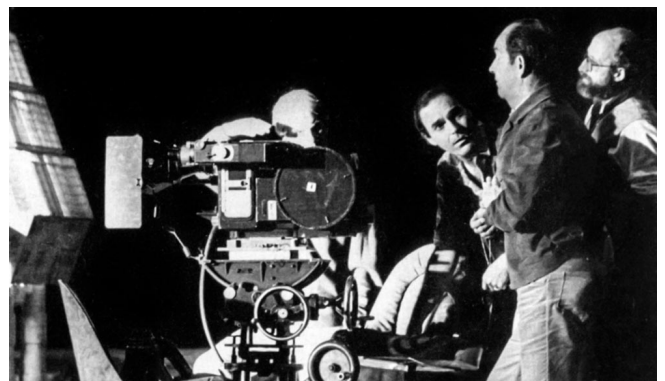
Once completed, the modules were delivered to the studio where John Stears and his crew made the final setups, added all the mechanized elements, and installed the fiber optic light sources.

starting somewhere. The first thing we did was the Pompidou module. We made the support frame for that out of brass and then built the building that sits inside primarily out of perspex (plexiglass). Even the support legs were plastic — just hollow plastic tubing. That stuff can actually take a tremendous strain, but I guess when they got it into the studio they put steel poles inside because they had to move the sections around quite a bit. Once we had the basic shapes, then of course, we had to add the detailing — wiggets, we call them. And we've found that you can wigget a model with just about anything. We use the old kit-bashing technique, as I believe it's called now, but we also use a lot of other things. When you're a model-maker, you develop an eye for interesting-looking objects, and you're forever tucking away things for future use. It takes a helluva lot of stuff to detail twenty feet of model, but I'd say about half of what we used on Outland was just bits and pieces that Martin and I had collected over the years. We used plastic seed trays, light fittings, Superglue dispensers, pencil boxes — anything and everything. We also used a lot of materials that are actually produced for architectural model-makers — all kinds of plastic tubing in round sections, square sections, rectangular sections, and various types of pipe bends and things like that. It really saves you a lot of time if you can use pre-formed objects rather than starting from square one and doing a lot of fiberglass work and injection molding."

The Con-Am refinery soon proved to be almost more than the pair of veteran model-makers could handle in the time allotted. Customary starting time was 7 a.m., and they frequently found themselves still working at 1 a.m. the following morning — seven days a week. Bill Pearson took to sleeping in the shop to save travel time. Yet they steadfastly resisted hiring on additional help. "We like to work on our own," Pearson affirmed. "We don't like to involve a lot of people, because it's our names that are up there on the screen — our reputations. And we want total control over everything that goes out. We did put out one job about a year ago, and the guy handed it to us just in time to deliver it to the studio — it was terrible, and we had to go along and make excuses for it. We decided then that we'd never put work out again. We found on Outland, however, that we were running out of time and if we didn't bring in some outside help we just weren't going to finish. So we did end up hiring out some of the very basic stuff like the framework for the solar panel area and for the greenhouses. We had three people knock up some basic perspex forms for us in their own shops — but we did all the detailing. We would never let anyone else detail a model or



Before replacing the detachable wall of the refinery module, Richard Roberts runs a test on the network of fiber optics installed within. In all, some four-and-a-half miles of fiber optic material was employed to provide practical lighting for the miniature.



Peter Hyams discusses a model shot with camera operator Bob Kindred and director of photography

paint a model that we were sending out, because over the years I've met maybe three other people who can actually wigget a model convincingly. Most people just slop on kit-bits without any thought at all as to whether it has some symmetry to it or whether it even looks functional." The detailing had to be incredibly intricate because Peter Hyams wanted the refinery to look as large as possible. As scaled to the twenty-foot miniature, a human figure would be about an eighth of an inch tall. "When we started on the miniature, Peter told us, 'Look, I'm going to get the camera three inches away from this miniature, so it's got to be good.' And we thought: Yeah, right. We've heard that before — "Make this miniature amazing in detail because we're really going to get close to it." ' And they never do. Well, Peter did! In fact, he got so close, it's unbelievable!"

Although the two-foot refinery prototype was not incorporated into the final structure, some other interesting shortcuts were taken. A moonbase model Bill Pearson had constructed for his first college film production found its way intact onto the refinery, and a spindly spacecraft he had built for an unrealized television project was transformed into a tower. One expedience nearly backfired. "We were given a drawing by the art department of the generator towers," Pearson explained, "and we were told they had to be pretty accurate. Well, the way they had it, it would have taken one man a couple of days just to manufacture the basic shape — and here we needed four or five of them. Fortunately, Martin happened to remember a spaceship he'd built several years ago for *Space: 1999*, and he said, 'I built it around this amazing lamp I got from Woolworth's, and it seems to me it was quite near in many respects to that design.' So he dug around in this box he had — because he'd bought an extra one — and sure enough, it was very similar in shape. So we thought, 'Right, we'll knock one up out of this and see what the art department has to say.' Well, one of their guys came around the next day, and he said: 'Wow, that was fast! It's beautiful — and so accurate.' And we said: 'Well, it's not really. Look at your drawings.' And he said: 'No, no. That's it. It's superb! Make the others just like it.' Well then, do you suppose we could find any more of those lamps? It seems they weren't being manufactured anymore. So we ended up spending every spare minute we had for the next two weeks running around to every Woolworth's we could find. Eventually we found a store that still had some."

Once the miniature was completed, it was sprayed with the gray automotive primer Hyams had liked on the prototype. Stenciling, instant lettering and decals were applied to give it additional detail and scale, and then it was "dirtied down" to age it a bit before delivery to the studio. After it got there, the decision was made to repaint the entire complex off-white. One of the intricately-constructed greenhouses was nearly a casualty of that decision. "Two studio trainees were asked to carry the greenhouses along to the spray shop," Pearson revealed, "and they dropped one. When we heard about it we were shattered. It was a large miniature, about six feet tall, and the face of it was clear perspex, divided up by struts that were mirrored on one side. Then we'd fitted perforated zinc panels across the inside so that when it was backlit there would be an interesting motif and a bit more scale to the model. We went around to see the

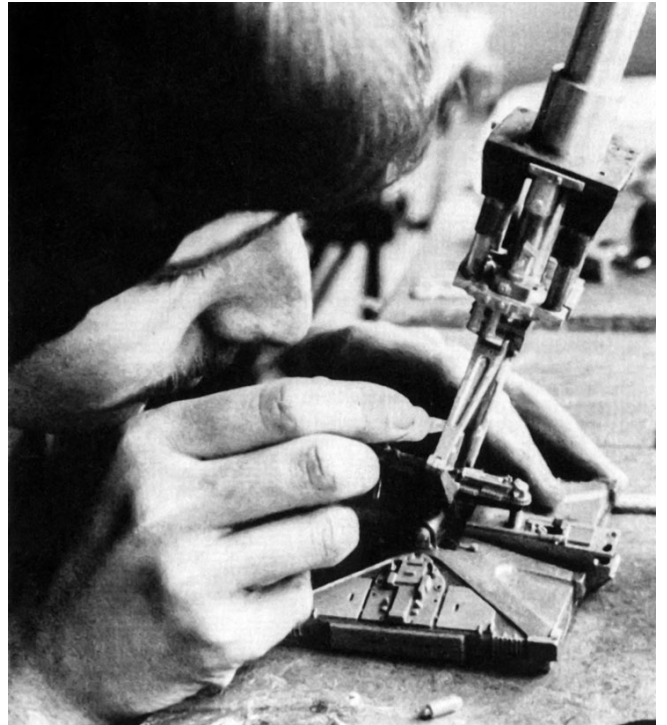
Stephen Goldblatt. During principal photography, Goldblatt was placed directly in charge of the extensive miniature work, while Hyams doubled as his own lighting cameraman on the main unit. Despite the primitiveness of the VistaVision equipment at their disposal, the effects unit employed the large-format system on all shots requiring later optical enhancement.

remains, and it was a mess; but luckily enough, the front wasn't damaged. Only the back section was gone, and they managed to repair it for the movie."

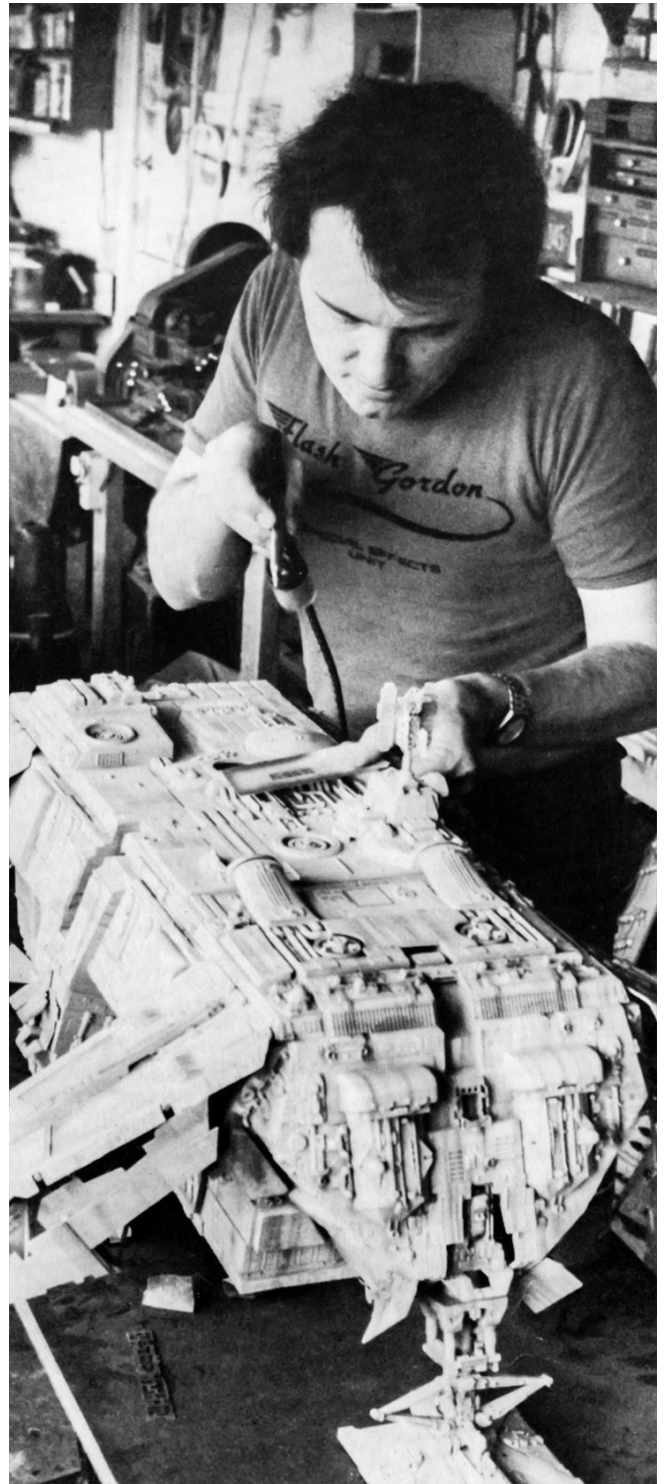
The Bowerhouse complex was to become the central set-piece of an overall miniature many times larger. A two-hundred-foot-long representation of Io's barren surface, fabricated from lumber and plaster and covered with orange dust, surrounded the refinery and occupied the better part of an entire stage. The stage itself featured a large tank, which was drained and incorporated into the alien landscape as a vast chasm. The complex was perched on the edge and giant elevator shafts extended down some twenty feet (representing more than a mile in full scale) to the actual mine area where precious minerals were extracted for subsequent processing and shipment back to earth.



The basic shuttle shape was fabricated in plexiglass and brass at Pinewood, and then turned over to Bowerhouse Model Associates for detailing. Martin Bower examines the partially-detailed top section.



Bill Pearson painstakingly "wiggets" one of the shuttle's landing legs.



Nearly completed, the shuttle is airbrush-painted by Bower.

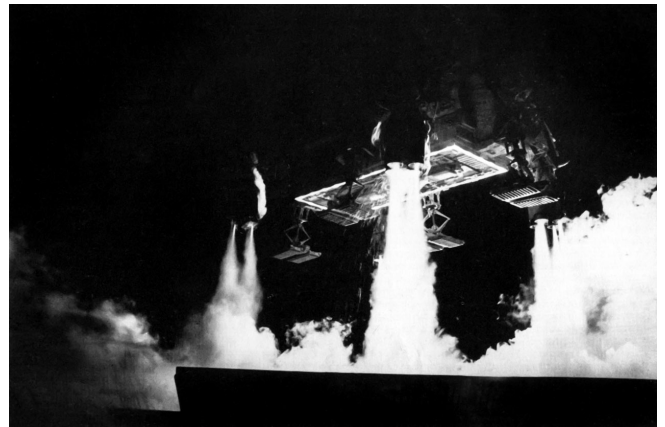
John Stears and a large crew of in-house model builders constructed the mechanized portions of the overall miniature, including the elevator shafts, the subterranean mine structures, and the rotating radar scanners. Much of the work was extremely intricate, and involved the development of a new ultra-thin injection molding process. Other major building efforts included the entire shuttle landing platform, with mechanized deflector shields and four cargo gantries, and the solar panel area. Once those units were completed, Bill Pearson and Martin Bower were called in for two weeks of detail work so the studio-built elements would conform with the rest of the miniature.

Fiber optics were the obvious choice for internal lighting, but selecting the proper type proved to be no small undertaking. "Normal fiber optics are directional," John Stears explained, "so you can only see the light being passed through it if you look straight on at the polished end. If you look at it from even a slightly oblique angle, the light will normally diminish rapidly. We went through about twenty or thirty different types before finding one that would transmit the right resolution of light for our purposes. The one we settled on is a special type of plastic optic which disperses the light in such a way that it allows a viewing angle of about 45 degrees, with little or no fall-off. Then, once we made our choice, installing it was incredibly time-consuming, since we had to use about four-and-a-half miles of fiber optic to light the model. Finally, we hooked them all up to six halogen lamps, and were able to get some really intense little light sources."

An experienced cameraman in his own right, Peter Hyams had a very specific, and somewhat unique, roll in mind for his director of photography. To fill that role, he chose Stephen Goldblatt, a noted documentary and commercial cinematographer who had only one feature to his credit, the British punk rock musical, *Breaking Glass*. "Peter needed someone who was attuned to how he thought," Goldblatt elaborated. "His whole object was that he didn't want to have a unit doing models and effects that had a visual style different from the rest of the film — which is what happens constantly." Mindful of his desire to maintain stylistic integrity throughout, yet aware that the economics of filmmaking required a separate unit to photograph miniatures and effects, Hyams essentially turned the second unit over to Goldblatt and became his own lighting cameraman on the main unit. "There was a lot of crossover from stage to stage, and we'd meet



Back at the studio, John Stears tests the docking mechanism on one of four motorized gantries which would later be installed on the landing pad.

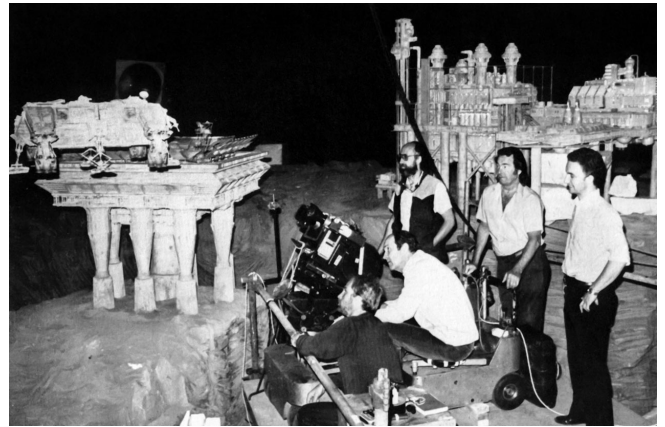


Mechanized blast deflectors elevate from the pad as the shuttle nears touchdown. Liquid nitrogen was piped through the engine pods to achieve the exhaust effect.

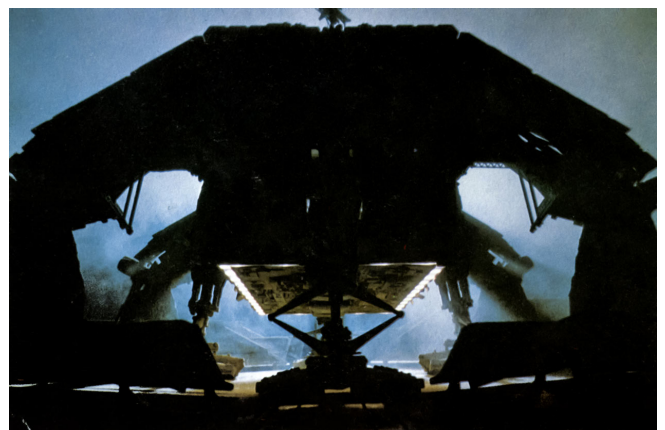
over rushes to compare and change notes, but essentially I was in charge of making sure the miniature work was in line with the 'look' that Peter wanted for the film."

Although a wide range of traditional opticals was to be employed throughout, Hyams placed his greatest trust in a new and relatively untested matting system to effect some of the grand imagery and spectacular vistas he felt were crucial to establishing the believability of his locale. "We went into Outland knowing we had some serious limitations in the special effects area. We knew, for example, that there were a lot of things we just couldn't do, even if we wanted to, because they would have required very sophisticated motion control equipment — the kind of things that only ILM really can do. But there was one sequence — the big climactic chase at the end of the movie — where we had to have people climbing around the outer superstructure of this massive refinery complex, and we wanted to really show the scale of this thing. To do that, we were faced with either spending \$115 million to build something so large that even the Astrodome couldn't hold it, or finding the movie process that would allow us to do what we wanted."

That process turned out to be Introvision. As described by Tom Naud, president and chief spokesman for the system: "Introvision utilizes a Scotchlite screen — ours happen to be thirty feet tall by sixty feet wide — so in that regard, we're front screen projection. But the finished piece of film produced on our system bears no other resemblance to standard front projection. We can do that kind of work, and we can also do maybe fifty percent of what would normally be done by bluescreen. But the one thing we do which is truly extraordinary is to create sets through the use of plates — be those 4×5 still plates or VistaVision film plates — and make those settings dimensional. In other words, with the Introvision system, we can have an actor walk vertically or laterally into what is essentially a two-dimensional plate, and yet make it totally believable by allowing him to move behind solid objects within that plate. And the process is instantaneous. So while it's fairly obvious that Introvision can have an incredible impact on the extraordinary-type film like Outland, where you wouldn't want to put a pencil to what it would cost to build those kinds of sets full-size, we don't look at it really as a special effects system. We see Introvision as a motion picture system that can help nearly any producer with the day-to-day practical problems of



Bob Kindred lines up a shot for the shuttle landing sequence. Behind is Stephen Goldblatt, and to the far right is assistant director Russell Lodge. The shuttle was flown on a monopole arm, which could be affixed to any one of six mounting points on the model to facilitate concealment from the camera.



The shuttle model was filmed extensively in extreme closeup without betraying its actual size — a tribute not only to the model builders and

filmmaking. From the small minute-and-a-half sequence that you want to take place near the Great Pyramids where it would be tremendously costly to send full crew and cast, to places like the

Vatican or the Kremlin where, even if they let you film in there, you couldn't afford to light it, Introvision can be an economic lifesaver. Instead of sending an eighty-man crew on location, all we have to do is send a plate photographer and he comes back with what's essentially a lighted set. From there, the average shot takes us maybe two or three hours to set up on a stage. But once we're done, the director can come in with his actors, he can see his composite through the camera viewfinder, and the finished film comes up in the next day's dailies."

The system, in operation, is startling in its apparent simplicity. The front projection screen — custom-made from thousands of pentagonal-shaped Scotchlite pieces to eliminate seam lines which might show on the finished film — sits at the far end of the stage. Despite its formidable size, a four-man crew can mount the screen on its tubular steel frame and erect the whole thing in about two hours. On the opposite end of the stage is the compact projector/camera unit. As with other front-projection systems, Introvision makes use of the remarkable light-reflectance characteristics of the Scotchlite screen, which returns light to its source virtually undiminished — but only directly in line with that source. At oblique angles, the light intensity drops off drastically and the image dissipates. Therefore, in order to apply this phenomenon photographically, both projector and camera must be positioned along precisely the same axis — a physical impossibility conveniently side-stepped by the employment of a beam-splitter. The beam-splitter, mounted at a 45-degree angle to the projector-camera axis, aligns the projected image directly along the camera's focal plane, even though the camera and projector are actually positioned at right angles to each other. The mirrored beam-splitter kicks part of the projected image up onto the screen, but being also semi-transparent allows the camera to see through it and thereby record the image reflected back. Actors and set pieces may be placed directly in front of the screen, because the image is so brilliant that the intensity of light needed to balance "live" elements to the screen completely obliterates the projected image from anything in the foreground; and since the projector and camera are in perfect alignment, the foreground elements themselves block any unwanted shadows they may cast on the screen. As commonly employed, front projection is simply a more sophisticated means of accomplishing traditional rear-screen process photography in that it provides a backdrop for whatever foreground action is required. If that action calls for anything beyond having actors stand in front of a projected plate image, then foreground set pieces must be constructed.

However, since Introvision has the capability of inserting an actor into the projected plate, the need for additional set pieces is largely nonexistent. Therefore, with the exception of the system itself and the screen, an Introvision shooting stage is practically empty. "All we really need to do," Naud explained, "is elevate our actor to whatever point we want him in front of our screen. And for that we can use two-by-fours and plywood — or whatever else we have. It doesn't have to look good, because the camera only photographs what we tell it is there. It's all an illusion. In fact, Introvision was created by a man named John Eppolito who, among other things in his life, was a master magician and hypnotist. And he understood illusion as only a man with that kind

detailers, but also to the stage crews who, Pew and the brief, but dramatically crucial, landing photographed it within exacting tolerances. Sequence required more than two weeks before the cameras.

of background could. For the past fifty years, people with tremendous technical backgrounds have been trying to do what John Eppolito has accomplished with this system. The difference was that John didn't really understand all the governing laws of optics — so he just circumvented them."

A renaissance man in the true sense of the term, Eppolito has dabbled in nearly every aspect of show business, from vaudeville and acting to magic and music. He spent most of his adult working life as a radio producer and director for ABC, and then about eight years ago, attempted to transition into film production. Like others who had gone before him, Eppolito was convinced that there had to be a more efficient way of making pictures; unlike most of them, he decided to do something about it. Forming an alliance with a young University of Southern California film student named Les Robley, Eppolito set up shop in a garage and began tinkering with front projection. "One night," he related, "about twelve o'clock midnight, I was with a still photographer friend of mine, and I said, 'I wonder what would happen if I did so and so, and so and so.' And he said: I don't know. Let's try it.' So we started fooling around with this film clip from The Wizard of Oz. Suddenly he started laughing, and he said, 'You're not going to believe what I'm seeing through this camera.' Well, it was astounding. I was in the picture. We didn't have a movie camera, so we took a Polaroid of it to show that there wasn't any trickery involved. I still have it. It was a shot of the yellow brick road, and I am behind Judy Garland in the picture. She's standing in front of me, and the dog is behind her. And it was very three-dimensional looking. We'd tried so many different things hoping to come up with a better way of doing the norm, and suddenly we were into the supernorm." As his work progressed, many of Eppolito's friends in the business helped out by loaning studio space and equipment without charge. The result was the first generation Introvision system. With his fledgling system on line, Eppolito shot a few film tests to demonstrate its capability, and began showing them to whomever would sit still long enough to look. "I spent every penny I had, and hocked everything I owned, to keep this going. The biggest problem with any invention is the greater it is, the worse it is, because you find that people don't believe what they've seen. They don't like to admit to themselves that they don't know what it's all about and they don't understand it. They nod their heads and they say, 'Yeah, that's fantastic,' and then they walk away and try to forget you. Because it goes against what they know. So it was two or three years before anything happened with Introvision. Then I met Tom Naud, and he immediately saw the potential of the system. With him behind it, we were able to open the door and really get off the ground, because we needed the money to go on and build a bigger and better system — to go into the Cadillac version of what we'd been doing with spit and chewing gum."

Two years and nearly a million dollars later, the Cadillac version of Introvision was ready to make its debut. Vastly improved in many respects from the original prototype, it was to be the vehicle by which Introvision would make its initial mark in the world. "We didn't want to attempt to come out into the motion picture field until we had all the problems licked," Naud affirmed. "We found by

image

Introvision was used extensively in the climactic gunfight which takes O'Neil and his adversaries out onto the outer superstructure of Con-Am 27. An advanced front projection matting process, Introvision's major attribute is its ability to place actors into 4×5 still or VistaVision film plates in such a way that they can move around and behind elements within those two-dimensional projections. In this shot, showing O'Neil crossing through the solar power plant area, only the

research that that was the mistake that just about everybody who comes up with a new idea in this business makes. I can understand it, because the investments get very large very quickly and you want to get out in the marketplace and get some return on your money. But this is an industry that historically has rejected newness — and I don't say that to be demeaning. Mistakes are very costly in this business, and there's no time to practice."

human figure is "real." The set, including the catwalk on which the figure is walking, is totally derived from a 4×5 transparency taken of a miniature and then optically enhanced with a background sliver of Jupiter.

The moment of truth for Introvision came with the acceptance of an assignment to aid director Joe Schumacher in producing composite footage for *The Incredible Shrinking Woman*. "We kind of got lost in the shuffle," Naud admits. "The production was way behind schedule, and they had all kinds of other problems, too. As a result, we sat around a lot on the stage, and we wound up doing, I believe, only about five shots for the whole picture — all of them in the sequence at the dinner table where Lily Tomlin is nearly drowned in champagne. But we got paid every week, which ultimately led some of the inner guard over there to announce that we were very good, but very slow and very expensive. Actually, we did our five shots in a day and a half, so I'd hardly call that slow — we sat for seven or eight weeks." The facts notwithstanding, Introvision's feature debut was less than auspicious, and no one at Universal seemed inclined to proclaim the wonders of the system. Their second film experience, *First Family*, proved even more disheartening. Introvision was commissioned to produce the footage required for the sequence in which Bob Newhart, as President of the United States, visits a small African principality to barter for their secret means of growing gigantic vegetables. The production department devised their own ideas for the sequence, independent of Introvision input, and as a result showed up for the shot with plates and a concept that were largely unworkable. After a disastrous first day on the stage, Introvision stepped in and took over totally, redesigning the sequence, preparing new plates, and reshooting it — at their own expense. Nevertheless, the experience left them with another black eye. "All of a sudden," Naud lamented, "here we were with two unreleased pictures, neither of which we were particularly happy with. And the word-of-mouth about us wasn't helping much either." Despite subsequent efforts by Warner Bros. to have Introvision extracted from the forthcoming *Outland* project, Peter Hyams stood firm behind his belief in the system, and The Ladd Company backed him up.

"As far as we're concerned," Naud continued, "*Outland* is really our debut in the motion picture business. For the first time we were dealing with people who had some inkling of what Introvision could do. Peter Hyams is a technically-oriented filmmaker. He understands lighting, he understands depth, he understands perspective. He's not just some guy who walked in off the street and announced he was a director. He's earned his way; he's very intense about his work; and he was the first director we had run into who truly understood what our potential was for his particular film. In fact, much of what we did in the film, he actually wrote in order to use the Introvision system. Then he had the models built, and he himself — after consultation from us — photographed the plates. The long and the short of it is, we went into *Outland* with a director, and an art department and a film crew that couldn't have been better. I must say that the crew was a little reserved when we first arrived — they didn't know what the hell we were

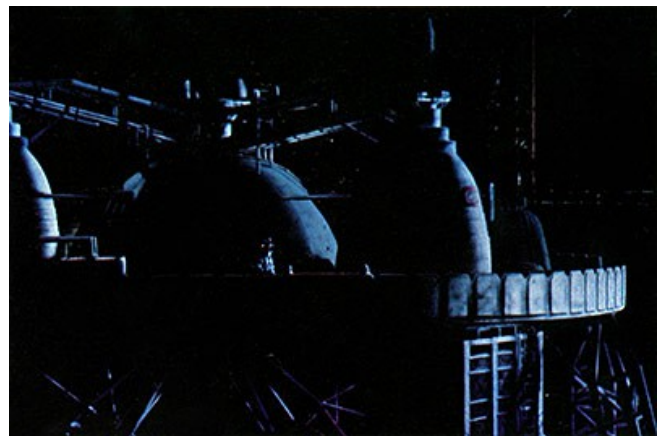
all about. But after about two days of dailies, we were the closest of allies. Despite whatever misgivings our previous employers may have expressed, the system worked perfectly. It never broke stride; it never missed a beat. Peter was able to shoot exactly what we said he could shoot, in the exact amount of time, and for the exact number of dollars we had specified.”

Illusion is the name of the game at Introvision. Everywhere you go, the word is on people’s lips. So it is not surprising that in the time-honored tradition of classic illusionists, secrecy and misdirection are the order of the day. But beneath the aura of near-mysticism projected by the Introvision team is a hands-on, nuts-and-bolts system that works — and delivers as promised. It doesn’t do everything, as those involved with it are the first to admit; but what it does, it does exceedingly well. The Introvision footage in *Outland* is clean, well-executed, and virtually flawless. And already the system is being toasted as the sort of quantum leap in technology — or at least technique — that some industry insiders have likened to the advent of color and sound.

From a technical standpoint, what sets Introvision apart from other compositing systems is that it combines its matte and countermaatte elements together in real time, and in such a way that the director can rehearse his actors on a barren stage and yet be able to preview the full composite simply by looking through the camera viewfinder. What allows the system to work, in principal, is a feature of the front projection beam-splitter which is ignored in traditional front projection applications. Since the mirrored beam-splitter must also be semi-transparent (to allow the camera to photograph through it), only about half of the projected light is actually thrown up onto the Scotchlite screen. The remainder passes through the angled mirror and onto whatever surface is directly behind it. Since the beam-splitter is also partially mirrored from the camera’s point-of-view, this image spill has to be absorbed by a flat black screen mounted opposite the projector in order to avoid ghosting over whatever actors or set pieces may be in the scene.



Peter Hyams selected a particularly minute segment of the Bowerhouse miniature for a key sequence in which O’Neil leaps from a circular platform down onto a translucent accessway through which one of his assailants is moving. Since the miniature section was so small — the domes were actually thimble-size — and was never intended to be more than an indiscernible shape in the background, the level of detailing was inadequate for Introvision use. To remedy the problem, the original transparency (top) was blown up to a 3×4-foot print and Introvision matte artist Tim Donahue airbrushed out the rough spots and added his own detailing, including giant air vents, corporate logos, pipes and guy wires. The enlargement was then rephotographed and used as a plate.



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This nuisance factor for standard front projection forms the basis of the Introvision system. Rather than absorbing the secondary image, Introvision inserts a small Scotchlite screen instead, enabling the camera to photograph the projected image from both screens simultaneously. By placing a large glass panel between the camera and the front screen, the areas on the projected plate behind which the actors need to move to create a dimensional effect can be matted out by the careful alignment of black paper, tape and paint

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applied directly onto the glass. The image entering the camera lens from this source will therefore include the background plate, with selected masked-out areas representing foreground elements, plus whatever actors and "live" set pieces there are in the shot. When an actor passes through the matted areas, his image will disappear. Then, on a second piece of glass placed between the beam-splitter and the side screen, an exact countermatte to the front glass is made. Those areas that are clear on the front glass will be darkened on the side glass, and vice versa. The image entering the camera from the side screen will therefore generally be the foreground plate elements behind which the actors are to move. Taken together, the actor can be made to wend his way through even the most complex two-dimensional surface, disappearing and reappearing behind plate elements at the whim of the Introvision operators.

Clearly, though, there is more to the system than the basic philosophy behind its matting process. Introvision is a complex amalgam of mechanics, electronics and optics projected well beyond current state-of-the-art — from its exceptionally intense light source (a 6000-watt xenon lamp) to its projector (capable of varying the image intensities on each screen and projecting still plates for hours on end without reducing them to cinders) to the advanced camera and head (capable of accurate alignment to thousandths of an inch). In addition, Introvision has overcome the problems inherent in shooting front projection closeups. (Taken with other front projection systems, most closeups tend to look like cutouts.) Only half-jokingly, Tom Naud declares: "If I had somebody I really didn't like very much, I'd give him a list of all the items on this system and let him spend a year or two trying to put them all together and make them work."

For Outland, Introvision's involvement began with a breakdown of the script and discussions with Peter Hyams and Philip Harrison as to how the system could best be utilized. By early June, the refinery model was fully in place and ready for photography, but a major point of indecision remained over whether to use VistaVision film plates or 4×5 transparencies for the Introvision footage. "They hadn't established whether Jupiter was going to have movement," said William Mesa, Introvision's cinematographer and creative director. "Jupiter rotates a lot faster than the earth, but even though the NASA photography of Jupiter has a lot of motion to it, it's actually speeded up about fifty or sixty times. If you were picking it up at natural speed, there'd be relatively nothing you could see, particularly in short cuts." The idea of injecting

movement into the plates which featured Jupiter persisted, however, so the decision was made to shoot essentially duplicate plates in both 4×5 and VistaVision formats.

Stephen Goldblatt was charged with lighting the miniature and producing all the VistaVision footage, a tasking which extended well beyond the Introvision requirements since a decision had been made to use the large-frame format for any Outland shot requiring optical enhancement. With nearly every model shot requiring at least optically inserted stars, the workload was considerable. "Peter was going for a very harsh and gritty look, and he wanted the exteriors to have that same sort of feeling. And since the complex was supposed to be lit by the sun, which was very far away and yet very intense, he wanted to create a single light source effect for the miniature photography. In order to do that, he had a couple of huge searchlights brought in and installed on the stage. You could spot and flood them to a certain extent, but they had a very narrow beam and it was Peter's intention to use them as a primary light source. As it turned out, the concept was terrific, but the actual mechanical quality of the searchlights was not. Sometimes we could get the most beautiful effects, but then there were other times when we had terrible flicker problems — particularly on the wider shots. So we ended up using a lot of conventional brutes — at least eight at a time, and that's not even on a very wide shot. For some of the wider shots at the beginning of the film, we used two searchlights, eight brutes, and God knows how much other stuff. It was incredible, but we needed all that to maintain depth of field. Then when you have that much light, judging the balance becomes very tricky. All in all, working with miniatures is a nightmare."

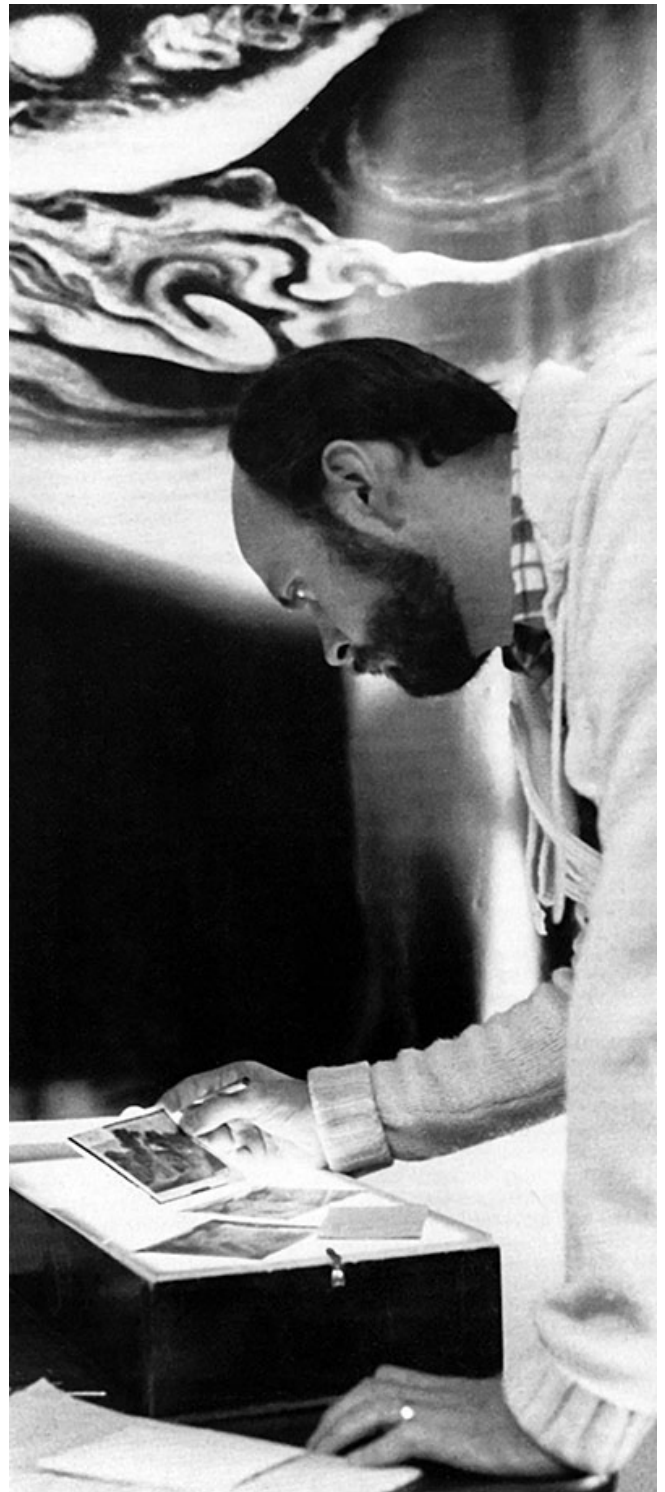
While Goldblatt struggled with his primitive VistaVision equipment, still photographer Douglas Dawson went about shooting the 4×5 Introvision plates. "In the beginning," Dawson explained, "there were only a few 4×5 nominated plates. Basically, they were going to use VistaVision. But as time went on, they decided they could do it better with a 4×5 camera. By the time we finished, there were only a couple of shots that used the VistaVision plates at all. Everything else was off still transparencies. Initially, though, we were kind of duplicating our efforts." Though the full Introvision team was not yet required, Bill Mesa flew to England for two weeks to observe the initial phases of the plate preparation and insure that they were being photographed to Introvision's exacting specifications. He then returned to Los Angeles, and subsequent plates were sent to him there for review. "We had about half of the plates shot prior to the picture starting," Dawson continued. "I was working alongside the VistaVision crew, so they were off while I was shooting, and then I was off while they were shooting. I think we spent about ten weeks on it all together. I started out using both Kodak and Agfa film stock, but I found the Agfa held up better, color-wise, so I ended up sticking pretty much to that. The lighting was very harsh, like it was coming directly from the sun, so there was very little fill — very contrasty. The Introvision people weren't real happy about that, because the plates had to be duped and as you do that you get even more contrasty. Therefore, if you start off with something very contrasty, you're going to begin to lose parts of it as you go through. It probably would have been better if we'd had a bit more fill, but I think it worked out well anyway."

Though the plate unit was working from storyboards created by the art department, Dawson shot hundreds and hundreds of transparencies to insure that every conceivable angle was covered. Specific selections were then made, and those chosen were given to Martin Shortall

who had been hired on to add star fields and Jupiters to whatever still plates required them. Once the basic photography was completed, Dawson was invited to assist in the optical enhancement phase. "Our first step was to get the original transparency blown up to a 20×16 print. At the same time, we had a high-contrast line negative made to serve as our matte. Most of these had to be retouched by a matte artist we had working for us. After that was done, we rephotographed the print, and then made a second exposure on a star field with the line neg matte in front to prevent the stars from bleeding through the buildings. For the star field, we used a four-foot by five-foot black plastic screen — very, very shiny — and Martin dabbed white paint on a toothbrush and just flicked the end of it so the paint sprayed out over the black plastic. Then we top-lit it from the sides so all the paint spots would show up as little dots of light. We had quite a lot of trial and error, just getting the intensities that Peter wanted. What we finally did was we made one setup, and then shot something like fifteen variants of the star field—all different exposures — so he could pick the ones he liked. Once we had that, we could pretty well hit it on the nose.

"Photographing the print, though, didn't turn out so well. We were losing a lot of resolution, and it wasn't sharp enough. So what we decided to do then was go from the original 4×5 transparency to a 20×16 transparency, which we mounted on glass and shot back-lit — and that worked out very well indeed. To diffuse the lighting, I took large, eight-by-four pieces of polystyrene and lit them from the front. Then, in front of these, I put a large sheet of tracing paper, about four feet away from the glass. So what actually happened was the light bounced off the polystyrene and then passed through the tracing paper, which gave us a nice, even illumination. After we shot the transparency, we dropped a screen behind the glass to block out the back lights and then put in the line neg and shot the stars top-lit from the sides. So every one was at least a double exposure. If we had to add Jupiter, it was more."

By then, the decision had been made to use a still representation of Jupiter in the Introvision shots. A large, immensely-detailed Jovian globe was located at Graphic films in North Hollywood, and subsequently photographed at Film Effects of Hollywood by Bill Mesa and Wally Gentleman . Unfortunately, it wasn't quite spherical," Dawson explained, "and it was a slightly different color from what Peter wanted. He wanted it really quite red and fiery-looking. In order to get around the fact that it wasn't quite spherical, we had to pick just a section where the arc was right and blow that up. Since you weren't ever going to see the whole planet in the frame at one time anyway, we could do that. The section we ended up with wasn't as large as we would have liked, but it worked out okay. Then, since the sun was way off in the distance and the light was coming in from the side, we wanted only a crescent shape to actually show — the rest of the planet would go into black. We used a black paper cutout to get that crescent, and then we softened it up by putting the cutout pretty close to the camera. We



Standing before a large blowup of Jupiter, Tim Donahue examines one of the 4×5 transparencies.

image

Another plate alteration job for the accessway sequence involved physically changing the overall appearance of the corridor itself. When the model was first constructed, the accessway was to have

also wanted to create an atmospheric halation, so we made two masks on the 4×5 plate — one of Jupiter and one at about 3/16ths of an inch away to create an even gap, which we air-brushed in slightly. Then we mounted it on glass, did one exposure of Jupiter and a second exposure with the mattes in place — both back-lit. The mattes we

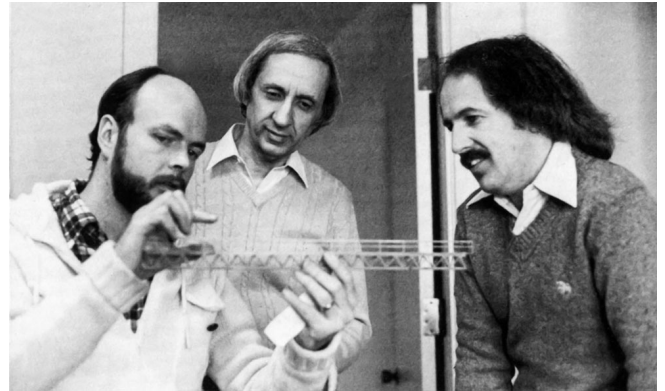
softened up by lightly smearing vaseline on glass in front of the lens. When we rephotographed it, we flopped the image in order to get Jupiter's 'red eye' and swirling clouds into a position where they would be most effective for Peter's shots. Then, to make the colors more dramatic, we put in filters and 'hotted up' parts of the transparencies with small spotlights. Once we got a Jupiter that Peter liked, we had that blown up to 20×16, too. Then, instead of having a single glass matte change, which we were doing before, I put another glass at the back so we could match up Jupiter with the transparency in the front and get it all lined up on tabs. Then we could go ahead and photograph the foreground buildings, Jupiter, and the stars as a triple exposure." Exposure times varied from about ten seconds on Jupiter and thirty seconds on the refinery complex, to about two minutes on the star field.

Stephen Goldblatt, meanwhile, was still trying to produce post-Star Wars effects footage with pre-2001 technology. "Peter wanted an opening shot where the camera comes in over the miniature terrain and up to the refinery. Motion control was out of the question — there just isn't any motion control in England — so the plan was to mount the VistaVision camera on a crane arm. The camera itself was incredibly crude. It wasn't reflex, which makes it difficult when you're shooting miniatures, and it was so old we were practically holding it together with string. Nevertheless, that's all we had, so we put it on the crane and tried the shot, but we just couldn't do it. No matter how large your model is, the scale is still so small that just the slightest unsteadiness will make everything look really fake. And the crane just wasn't steady enough, so we'd have to get it into a stationary position and lock it off. Then we could do rises and pans and everything, but we had to cut our way in on the terrain as we got closer and closer to the model. We were very fortunate that the new fiber optics that were used for the illuminated portholes and windows were so bright that we could shoot at f/32 or f/45 and still read them. If we'd had to do a separate light pass for the fiber optics — which you frequently have to do in this kind of work — we wouldn't have been able to move our camera at all. All the shots would have been completely static."

One of the more arduous aspects of the model photography involved the arrival of the space shuttle carrying O'Neil's intended assassins. "The shuttle landing is an elaborate and very dramatic sequence in the movie," Peter Hyams explained, "and I wanted it to be ominous. It seems that lately all you see are spacecraft zipping about with the greatest of ease, looking like the equivalent of 22nd Century Alfa Romeos. I didn't want that. Again, I wanted something functional — a big flying box that you could stuff as much freight into as possible. After all, what you're doing is ripping your way through a vacuum, traveling always very close to the brink of blowing yourself out of the sky or missing your target. So I wanted it to be big and ugly and ponderous, with all the noise and glare and ferocity something like that would really have."

been hexagonal. John Stears' crew incorporated yellowish lights. By the time the full-size set had been constructed, however, the shape had become more triangular and the lighting was much whiter and more uniform. Donahue altered the plate with his airbrush to conform with the new design, and even extended the corridors to create a more pleasing composition for the wide-screen format.

Hyams' "flying box" went through several radical design changes within the art department, and was then turned over to John Stears for construction. "The basic structure was made from perspex," Stears elaborated, "all packed with wires and tubing and halogen lamps. We didn't want to fly it on wires, so I designed a large monopole — a rigid, crane-like arm which weighed about a ton and a half and which we could drive precisely using a worm gear mechanism. The shuttle could be attached to the monopole at any one of six different contact points, so no matter what angle you were shooting from, the mount could be concealed from the camera. Then we lit the model carefully, and draped black velvet over the monopole to make certain it wouldn't show."



Introvision team members Tim Donahue, John Eppolito and William Mesa examine a section of the solar panel miniature on which O'Neil's figure would be placed utilizing their matting system.

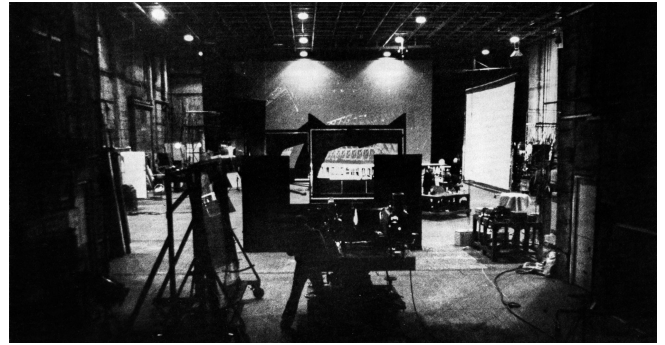


On the Introvision stage, Donahue applies black tape, paper and paint onto a large glass panel to create one of the mattes for the subterranean mineshaft sequence.

Once completed, the four-foot shuttle went to Bowerhouse Model Associates for detailing. "When it was delivered to us," said Bill Pearson, "it was basically a perspex box with metal legs and various brass flaps and plug-in points for the supports. We built up a lot of detail with sheet plastic. We'd score the perspex halfway through with a band saw, and then pass it over and over the blade to give it a lot of interesting paneled areas. We also used etched brass. All the rows of shipping containers are individually-etched brass plates. Then we cut up thousands of little pieces of plastic card and glued them on to build up some really nice surface textures."

After a paint job and some add-on aging, the shuttle was returned to John Stears' shop where it was outfitted with four large retro engines. "For our exhaust," said Stears, "we used liquid nitrogen which was fed into the model through copper tubing at the mounting point. Carbon dioxide is more commonly used; but after experimenting around a bit with various things, I decided on the liquid nitrogen. It's under extreme pressure, so the thrust effect was very good and we were able to get about a fifteen-foot plume. One of the side-benefits was that liquid nitrogen's very cold — about minus 140 degrees Centigrade — so it helped keep all the halogen lights from overheating the model. On the other hand, the landing platform was also made out of perspex and we were concerned it might crack, so we installed halogen landing lights to compensate."

More than two weeks were spent getting the relatively brief sequence on film. "We had a lot of difficulties," Stephen Goldblatt recalled. "The sequence required incredible depth-of-field, so once again we were shooting VistaVision at f/45. Lighting, as always, was a problem. We were using brute arcs like you'd normally use 2K quartz, and at one point the shuttle actually started to steam. So that was also a concern. We had to do a lot of two-pass shots — static, of course. We had one that was a low-angle view from the landing platform. Four docking cranes go out to the shuttle once it's landed, and Peter wanted a shot looking up, with a crane in each corner of the anamorphic frame and the shuttle coming straight down into the lens. Well, we couldn't hold the focus — there was no way. So in the end, we shot just the shuttle coming down, pulling focus on it against black. Then we took the shuttle away, wound the film back, put in the cranes and focused on them. It was only at the very end of the shot that the cranes cross over, and at that point there's so much billowing nitrogen that you don't see it. We had terrible problems, again, getting the nitrogen to plume out correctly. The jets would freeze up, or some of them would start to spit, or the nitrogen would buckle the landing platform — ad infinitum. It went on and on. Then we had all the other stuff with the strobe lights that the pilot uses to lock onto, and the blast deflectors coming up prior to landing. The strobe lights we found we had to run at different speeds when we had different camera angles, because even though it was exactly the



The Introvision system employs a front projection beam-splitter which throws part of the plate image up onto the large Scotchlite screen at the rear of the stage, and part of it onto a side screen located about six feet to the left of the camera. The system combines matte and countermaatte elements in such a manner that a director can preview his finished composite merely by looking through the camera viewfinder.

same speed, it appeared different when your perspective was different. All these things we learned by bitter experience.”

The Introvision team arrived with their equipment in mid-August and were given a full stage to themselves, allowing them the opportunity to spend whatever time was necessary to set up their shots while the main unit worked elsewhere. When a setup was complete, Hyams and his actors could be called to the stage and the shot completed without delay. After a two week period of setting up and testing, the Introvision unit swung into full production in early September.

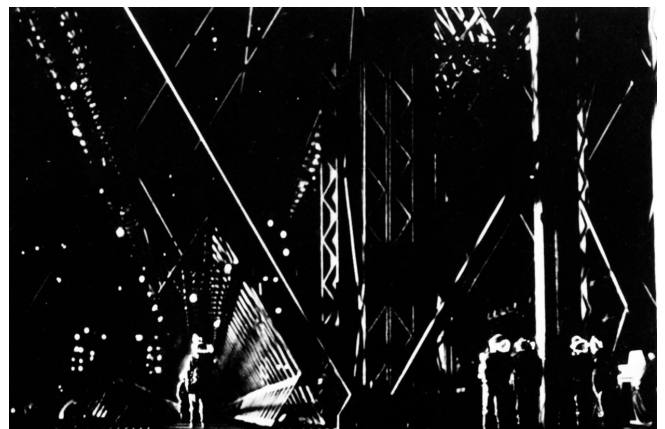
Most of the Introvision footage was to occur during the film’s climax when the marshal and his adversaries confront each other in the deserted corridors and grottoes of Con-Am 27. And ultimately, the chase was to take some of them onto the outer superstructure of the complex, where the perils of personal combat were to be further compounded by the horrors of Io’s singularly inhospitable environment. “From the start,” said Bill Mesa , “Peter wanted to create the impression that this structure was incredibly vast. So he wanted tremendously wide shots — wider than you could ever do normally unless you went through double or triple optical reductions with all the resulting image degradation. At the time, there were still a lot of things that hadn’t been tried with this system, and I told him I just didn’t think we could get them as wide as he wanted. As we were planning the shots — all the 4×5 plates — we figured on having our human figures about a quarter of the height of an anamorphic frame. But I told Peter that along with the plates we had specified to go ahead and shoot whatever widths he wanted also, since shooting the additional plates wouldn’t take that much more time. Well, when we got to England, the first shots we did, we decided to make as wide as we possibly could. So we set up our system about 270 feet away from the screen, and we did three test shots to see how small we could get our figures. And it was really great, because we ended up being able to give Peter more than he’d hoped for. In fact, he came in and he looked through the camera, and said, ‘Well, I guess if you get them any smaller than that, we won’t be able to see them at all!’ Our longest shot in the film was actually made from 318 feet away. We had to use walkie-talkies to communicate back and forth.”

Visualizing how Introvision can take a six-foot human figure, place him in front of a thirty foot high screen, and yet come up with a composite image which reduces that figure to a tenth or a twentieth of the final frame height, is a baffling exercise in perceptual gymnastics. “Actually, the distance the camera is away from the actor is all you really have to worry about,” Mesa explained. “That determines how small the actor is going to be in the frame. In that respect, an Introvision shot is no different from any other camera shot. What our system is capable of doing is making the set any size around him.” It does that, ultimately, by projecting only a portion of the 4×5 plate onto the front screen — whatever portion is necessary to give the human actor proper scale within the plate as a whole. The entire plate, however, is projected onto the side screen. Those portions of the overall image area which exceed the physical limitations of the front screen can thus be brought back to the camera’s eye from the side screen. A variation of the same process was employed in one of the film’s most impressive effects shots. “We had a scene of Sean Connery climbing up a ladder on the outside of the greenhouse, which was supposed to be a tremendously tall building. When the shot begins, Sean is out-of-frame. We

start at the bottom of the upper greenhouse tier, and then just pan up and up, until way up at the top you see him climbing the ladder. The whole shot was done off a single 4×5 transparency, and Sean was actually only about five feet off the ground.”



An Introvision shooting stage is remarkably barren. The pressure-suited miners were positioned, simply enough, on large steel platforms, and then instantly composited into the seemingly vast mine-shaft set (right), which in reality was a two-foot-tall forced-perspective miniature.

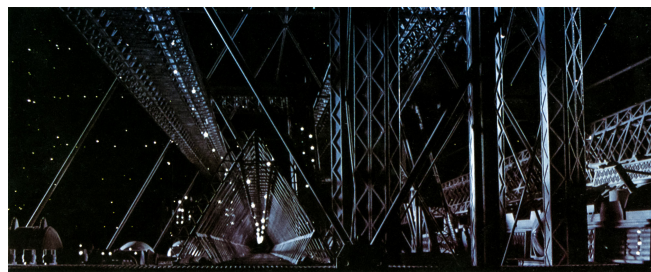


An Introvision shooting stage is remarkably barren. The pressure-suited miners were positioned, simply enough, on large steel platforms, and then instantly composited into the seemingly vast mine-shaft set (right), which in reality was a two-foot-tall forced-perspective miniature.

The greenhouse sequence was to provide an excellent test of Introvision's overall credibility. Under attack from all quarters within the complex, O'Neil dons a pressure suit and makes his way out through one of the airlocks. While one of the hit-men searches for him inside the greenhouse, the marshal makes his way to the top of the same building from the outside. After breaking off a section of solar paneling, O'Neil lets it drop down the face of the glassed-in structure. The assassin inside catches a peripheral glimpse of the falling object, spins and fires his shotgun. The glass shatters. The building goes into explosive decompression, and O'Neil's assailant gets sucked out into the void. Although one scene, showing the man being swept toward the gaping hole, required bluescreen compositing, all the other shots involving actors — both inside and outside the greenhouse — were done with Introvision. In fact, for this major sequence in the picture, no full-size sets at all were built. Instead, the settings were derived from still photographs taken of a ten-foot-tall quarter section of the full greenhouse — one of several scaled-up models of the refinery complex built at Pinewood under John Stears' supervision.

The actual explosion was shot as a straight miniature, again using the large-scale greenhouse model. "To create the impresssion of mass," said John Stears, "we had to shoot high-speed, which meant we couldn't use the old VistaVision camera because that could only go about two times normal speed before blowing up. Then, getting the right glass was a problem, because the optical properties of normal breakaway glass are really poor and we needed it to match the other shots in the sequence. We finally found this special glass — plastic, actually — that was the right color and very clear. By scoring it, we could even control the way it shattered. In fact, for the closeup shot of the bullet going through, we actually used stop-frame photography."

"For the high-speed work," Stephen Goldblatt elaborated, "we had a Photosonics camera, which in theory could go to 360 frames per second, but we were never able to get it past three hundred. And of course, shooting high-speed, we needed even more light than usual. We had something like twenty brute arcs just for the general background — and that was only for starters. Behind the glass, Johnny Stears and his people set up a series of compressed air nozzles, about two or three inches in diameter. In one of them they put a little miniature man about six inches tall, and in the others they put vegetation and stuff that was supposed to be inside the greenhouse. Then on cue, with the Photosonics up to speed, John would stand back there with a double-barrel shotgun and blast a hole through the glass. So you'd see all the broken fragments exploding past. Then, with just a hint of a separation, they'd fire the nozzles and the vegetation and dirt would come shooting out, followed by the little man. Of course, at those kinds of speeds, we didn't know what we were getting until we saw it in rushes. Even at three hundred frames per second, though, Peter thought the action was a bit too fast, so he had



Although 4×5 still plates were used almost exclusively for the Introvision work, the mineshaft sequence required VistaVision film plates since a miniature elevator had to descend into the frame, come to a stop, and open its doors. The plate photography required three in-camera light passes, and major problems were encountered when the one-inch-tall elevator doors refused to open smoothly.

it double-printed to get a six hundred frames-per-second effect. Normally when you step-print like that you can really see it because it looks jerky. But at three hundred frames per second, there's so much information on the frame that you really can't tell.

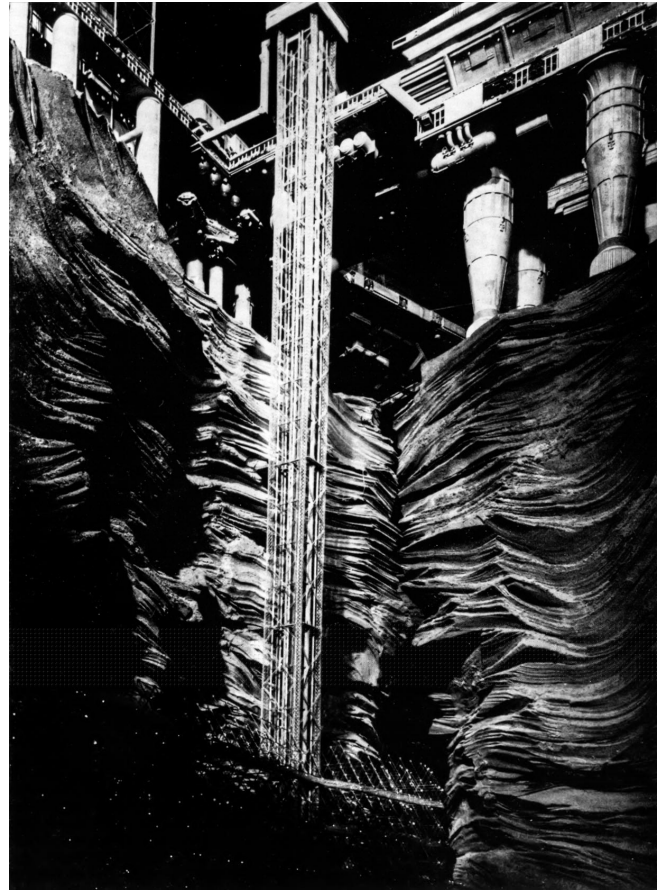
"For the shot before that, we had to show all the greenhouse vegetation getting sucked up out of their troughs. That was done with a sort of long wind tunnel, the roof of which was chicken wire. On top of that was earth, and then the plants were just resting in there. A large wind machine at one end of the tunnel would blow down and hit a baffle so that the air would push the plants and earth up. Then as they rose, another machine off to the side was turned on to blow them away. So what you have is a shot where the plants just kind of lift up into the air, almost hover there for a moment, and then just get sucked away toward the hole."

Another elaborate sequence involved an earlier confrontation, as O'Neil, making his way across the refinery superstructure, comes to a vantage point above one of the tubular access corridors leading from one building to another. Inside, through the translucent walls of the accessway, he discerns the silhouette of another armed assailant. Letting the one-sixth gravity of Io cushion his descent, the marshal leaps down onto the corridor, and from the outside, detonates the explosive bolts holding two of the prefab sections together.

Among the earliest of the problems associated with the sequence was the fact that Peter Hyams had elected to stage his action in a remarkably minute section of the Bowerhouse refinery miniature. O'Neil was to make his way past a number of large domes on an elevated platform, jump twenty feet from there down to a secondary platform, and then jump again onto the accessway. Introvision matte artist Tim Donahue, who was there specifically to handle the complex on-stage matting for the system, was to become a key player in the sequence. "When I first got to England, I found that there were about seven or eight plates that had some problems, all of them having to do with this one sequence. For the plates, they had used a section of the model that was only about the size of a normal teacup, and the domes were like little thimbles turned upside down. The problem was that Sean Connery was only supposed to be about one-fourth the height of these thimbles as he walks across the platform. And even though all the models were incredibly detailed, it was impossible to take a section that small and blow it up to full screen size without it looking like a miniature. Even the texture of the spray paint was too rough. Since they didn't have time to reproduce that small section in a bigger-scale model, they decided to make large photographic blowups and have a matte artist clean them up. But when I got there, they'd been having some trouble getting the work done because most of the matte artists available in England were already on other projects. Philip Harrison asked us if we had any ideas. Bill Mesa was there, and he turned to me and said, 'Do you think you can handle it?' And I said: 'Oh, sure. I could do it, but I don't have the equipment.' So Philip got on the phone and called somebody in, and he said, 'Take Tim into town and let him buy anything he wants.' "

Donahue selected an airbrush, along with associated supplies and equipment, and by the end of the day had set up his own art department. Working under Hyams' direction on three- by four-foot photo enlargements provided to him by the optical staff, he painstakingly airbrushed out the ragged areas and added his own smooth-shading and detail work. "Actually, I think I spent more time on the matte paintings than I did on the Introvision setups on stage," Donahue admitted, "but the results came out very well, I thought. Even though we were a generation or two away from the original plate, I was able to reduce a lot of the grain by painting over it and making it more like an original again. Peter also asked for some structural modifications. The one building looked kind of like a plate on top of a dome, with another dome on top that had no connection to the bottom one, and then these four little thimble domes that had no connection underneath either. Functionally, it just didn't seem reasonable — which is certainly no criticism of the model builders. It was a tiny section way at the top of a building meant for the background, and only after it was built did Peter decide to focus action on it. So I asked Peter what it was supposed to be, and he said: 'I don't know. Let's make it an air conditioning unit.' So I painted these big vents and put one of them under each of the thimble things in order to have everything attach through the plate onto the big dome. Then I put on a Con-Am logo and a lot of pipes and guy wires all over. I also had to change the corridor Sean Connery lands on, because the design had been considerably altered by the time they got around to building the full-size set for it. Instead of being hexagonal with yellowish lights inside, it was more triangular and almost totally white. So I ended up painting over the corridors entirely and starting from scratch. I even extended them somewhat to make a more pleasing composition for the wide-angle film format."

Once the plates were altered to Hyams' satisfaction, the sequence went to the stage. A key establishing shot was to be a down-angle view from the platform as O'Neil steps into frame in closeup and spots the silhouetted figure of the hit-man in the corridor below. "What we ended up using for the silhouette, believe it or not," said Donahue, "was a little two-inch-tall paper cutout of a man carrying a gun. A platform was built for me to lay on, up above out of projection area, and I just hung this little cutout man down on a string and moved him around. We had the string rigged through pulleys so he would move very slowly; but that didn't work, because when



A fifteen-foot mechanized elevator shaft was built by John Stears' effects unit to connect the subsurface mining area with the above-ground elements of the Con-Am complex. A large tank on the miniature stage was drained and incorporated into the set as the mile-deep chasm inside which the physical mining operation is centered.

the string went through the pulleys, it twisted. So the little guy looked like he was pirouetting down the hallway. Peter shot it, but I could tell he was laughing. Then we tried it without the pulleys — just holding the string by hand — and that one he liked. It's just a simple quick cut — you wouldn't want to spend a whole lot of time on it — but it did the job. And because we were able to make an instant double-exposure off the side screen, it actually looks like the man's inside the the corridor — going behind all the uprights — which is pretty surprising when you consider that there wasn't a man and there wasn't a corridor."

O'Neil's jump was to be one of Peter Hyams' extra-wide shots, requiring the Introvision crew to position themselves 270 feet away from the screen. He was to jump from an upper platform to a lower one and then onto the corridor — all in one shot. To enhance the apparent scale, while at the same time reducing the size of the actual jumps, a midget stand-in was used for Sean Connery. "It was the first time we ever did a wire shot," Bill Mesa explained. "Generally when we do a shot, we make our matte correspond to the area of travel within that shot. But on this one, the first couple of times we set it up we tried to make the matte as tight as we could to the wire and the line of flight, but the guy kept going behind it. So we had to keep readjusting the matte until we got it right; but once we did, it really worked well. In fact, in many respects, it's easier to do a wire shot with Introvision than it is with most other systems. Obviously, one of the major concerns with wire work is concealing the wires. But usually, whenever you spot a wire, it's because it goes all the way up and out of frame. With the way we matte, the wires go maybe a foot or two above the person, and then they end — so you really can't spot them very easily. Plus we covered them with front projection material, so they'd tend to blend in with whatever was on the screen. We did a couple of other wire shots for that sequence, too, including the follow-on shot where Sean Connery's stunt double lands on the outside of the corridor." Although most of the Introvision shots had pretty barren sets — a railing or a ladder, or perhaps a small section of wall if somebody had to make actual physical contact with it — this particular low-angle shot employed a thirty-foot full-scale mock-up of the corridor, which was pushed right up to the screen. So while the background was still derived from the plate, Connery and the corridor section he was crawling along on were real.

Once O'Neil detonates the connective bolts, the accessway ruptures, and his adversary literally explodes from the acute pressure differential. Hyams had already set the stage for this grisly effect with the picture's opening suicide. "It's fairly jolting," he admitted, "but it's not done gratuitously, or for horror. It's done to set up, very carefully, what this environment is really all about. These people are living in a very hostile place, physically. And some of these effects are there to show just how serious that threat really is. When you're in an environment with zero atmosphere — and even more significantly, zero pressure — some awful things can happen to you if you expose yourself to that environment. So if somebody were to have a pressure suit on and then suddenly open it up — which is what happens very early on in the movie — I assure you it would ruin their day." While the effects approach for both shots was basically the same, the earlier one was somewhat simplified by having the victim encased in a pressure suit and helmet. For the accessway shot, however, O'Neil's assailant was out in the open and more conventionally dressed. Although exploding humans have become a virtual staple in recent horror films, Hyams' concept was to cause headaches — both figurative and otherwise — since

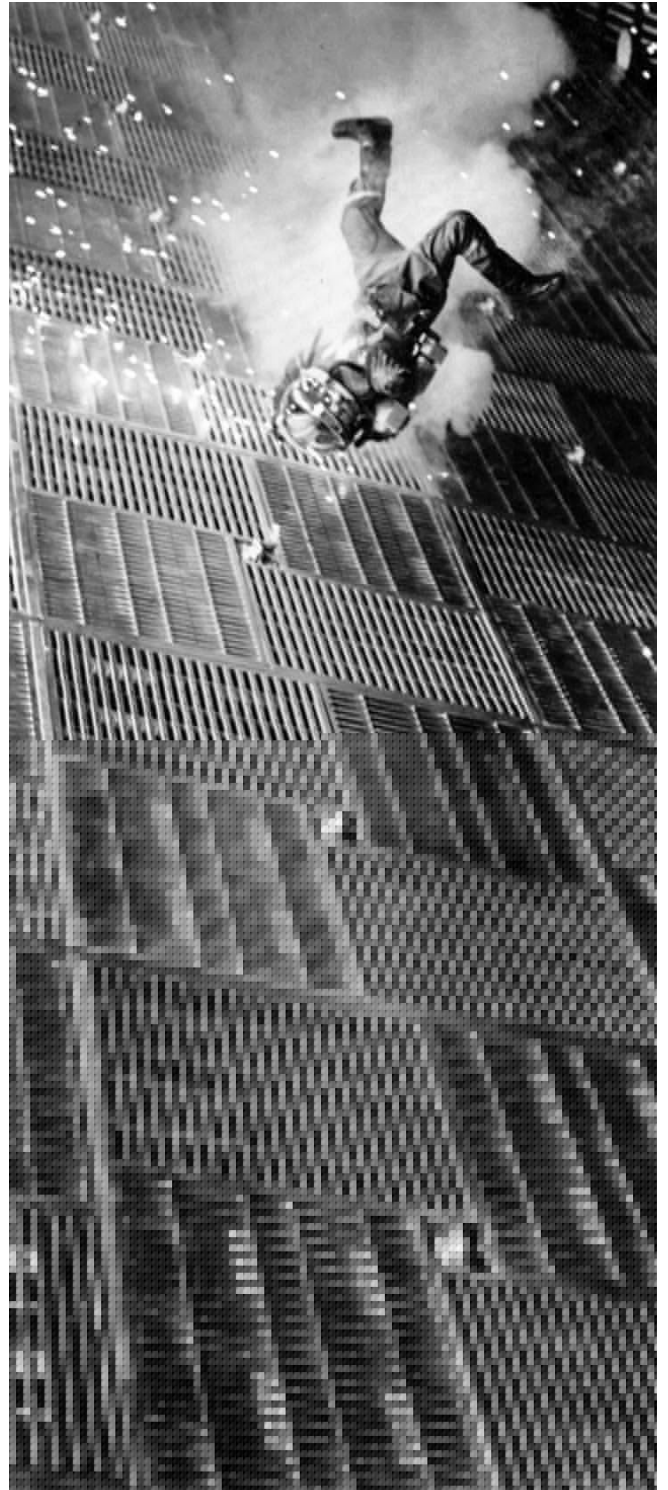
he wanted to have the gunman physically moving down the corridor at the time of his unsightly demise.

"The exploding heads were made in the makeup department," John Stears explained. "They were flexible so we could pump them up with compressed air, and they were very detailed. Then we had a stuntgirl, who was considerably smaller than the actor. We put a helmet on her, and then fit this artificial head and shoulders on above her own. We had blood bags and stuff inside, plus an explosive charge. The explosives were pretty tricky, since her own head was only about eight inches away, but she could move down the corridor wearing this thing as we pumped it up and then detonated it."

"It was all shot high-speed," Stephen Goldblatt added. "The basic makeup was wonderful; but then when the face expanded with the gas, sometimes it would expand too slowly or explode too quickly — stuff like that. We had some really ghastly-looking shots where the eyes would begin to pop out too slowly, or the face would expand like a fun-fair face. And, of course, for ages, the test shot we did was the best one; but we couldn't use it because it wasn't in the right setting. So we kept setting it up and doing it over, because there wasn't any real way of telling what it would look like, except by doing it. The idea of using the little stuntgirl worked fine, but I believe the most successful shot was just a static one, up close."

Outland's last major effects sequence takes place on the solar panel module as O'Neil makes his way back to the airlock, secure in the knowledge that he has dispatched his second and presumably final assailant. A volley of gunshots, however, convinces him otherwise. The ensuing confrontation takes O'Neil and his adversary onto the front face of one of the massive energy collectors for a climactic hand-to-hand battle to the death.

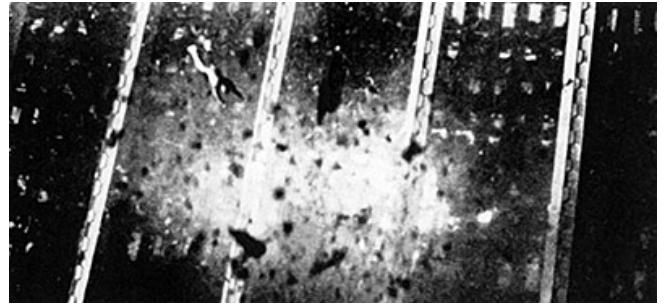
Although some of the sequence's lead-in shots employed the Introvision process, the majority of the more complex ones were painstakingly composited by Roy Field using bluescreen techniques. A fifteen-foot enlarged section of the solar panel area provided the basis for most of the background plates, while a still larger full-size panel section was used on stage for closeup shots where opticals could be dispensed with altogether. Since most of the stage photography required low-gravity simulation, flying rigs were used extensively. For one shot, the two men were supposed to break through a railing and tumble down the face of the structure. "Peter worked out a wonderful way of doing that," Goldblatt recalled. "He had the panel section lying horizontal rather than vertical. Then he turned the camera on its side and ran it across the panel. Alf Joint, the stunt coordinator on the picture, had his people in these special double harness rigs so they could tumble on wires. The camera tracked with them as they moved along, and since the camera was shooting sideways, it appears like they're making about a hundred-foot drop, when in fact they aren't at all." For a later, similar shot, electrical effects devices were implanted on the full-scale panel and sequenced to arc as O'Neil's final opponent plummets to his death — ricocheting off the high-voltage surface and leaving a residual trail of sparks and smoke.



For the scenes in which O'Neil's final adversary tumbles headlong down the solar panels, Peter Hyams had a full-size panel section mounted horizontally, rather than vertically. He then mounted the camera on its side. A stuntman in a flying harness was rigged to tumble horizontally across the panel; but on film the image created was that of a straight vertical drop.

Meanwhile, it was beginning to look as though the Introvision team would be finishing up a week before their scheduled completion date. By this time, however, Hyams was so bewitched by the footage he was getting that he began looking for additional ways to work new Introvision shots into the story. What he and Philip Harrison came up with was a means of creating a transitional bridge between the miniature mine, shown in long shot, and the full-scale section of it which had been built for scenes involving the actors. "The mine was supposed to be about a mile deep inside this moon of Jupiter," Bill Mesa recalled, "and they had a tremendous set which they'd built for it that was about a hundred feet by eighty feet, but they didn't have any way of showing how the people get down into it. So they decided to come up with a model of the mine shaft, and we told them we could put people down inside there. That particular sequence was, in fact, the only one in the picture where we used VistaVision film plates rather than 4×5 still shots. We did that because we had to have the miniature elevator come down into the scene, open up, and real people come out."

Since John Stears and his people were already overcommitted, the mine shaft miniature was contracted to an outside model shop. "We'd learned our lesson by then," Stephen Goldblatt asserted, "so we designed the mine shaft miniature in forced perspective. By foreshortening everything, we were able to simplify our depth-of-field problems — somewhat. But we still had to do three passes with the VistaVision camera. We did one pass on the background, which was sort of the interior of the mine. There were a lot of little fiber optic lights back there, and they have to be sharp — otherwise they become huge. Then we did another pass for the actual structure, but at a different exposure and a different focus. Then a final pass on the lift coming down. And if anything went wrong on any one of them, we had to start all over again. We had a lot of mechanical problems with getting the lift doors — which were only about an inch tall — to open properly. The light inside the elevator caused the material to expand; and when something's that small, it only has to expand a hint to get stuck. So Johnny Stears' people had to tear it apart and put it back together again. That miniature cost something like \$20,000, and it still



The greenhouse explosion was shot highspeed using an enlarged section of the glass-fronted building. John Stears began by firing a shotgun blast through the breakaway glass. Miniature vegetation and a six-inch model man were then blown through the hole with compressed air.



Direct exposure to Io's inhospitable environment causes humans literally to explode from the severe pressure differential. For such scenes, flexible heads which could be inflated with compressed air were constructed by the makeup department, and then fitted with explosive charges.

took about three or four weeks after delivery to get it functioning smoothly.” In addition to placing pressure-suited miners into the elevator and foreground corridor sections, Introvision positioned other workers on scaffolding way back into the darkened recesses of the mine by again employing midget performers as, in essence, forced-perspective humans. Though effective, Peter Hyams thought the background miners detracted from the foreground action, so he had the shot redone without them.

Despite the added workload, the Introvision crew finished up on their original schedule, producing approximately fifty first-generation composites in only four weeks. John Eppolito had seen his brainchild come a long way since his first midnight excursion onto the yellow brick road. “The beautiful part about what we do,” he affirmed with considerable pride, “is that if we do it right, no one knows we did it. And I think *Outland* has a lot of good examples of that. There’s no real way of knowing that there are special tricks being played — you just can’t see it. Introvision’s not like some systems where you have to figure on cutting away after six or seven seconds for the effect to hold up. You can take much of our film and project it on the wall for hours, and still not be able to find a flaw; you can even put it under a microscope, if you want.”

Outland wrapped principal photography in mid-October and plunged directly into a compressed six-month postproduction effort designed to ready the film for its scheduled May 1981 release. For Roy Field, the most difficult aspects lay yet ahead, as the long, labor-intensive optical phase shifted into high gear. And for him, the schedule was none too generous. Indeed, with only a few weeks yet remaining before the picture’s release, editor Stuart Baird — whose recent work includes the finely-honed editing of *The Omen* and *Superman*, plus an uncredited salvage job on *Altered States* — was still cutting just-completed opticals into the picture. Meanwhile, Peter Hyams shuttled back and forth between London and Los Angeles, orchestrating the postproduction effort and overseeing final details.

Without equivocation, Hyams considers *Outland* his best work. “*Outland* is a very complex film from a production point of view. Aside from your own imagination and sense of what is ‘right’ you have no real frame of reference for a film of this type. And yet you have the responsibility of trying to create a world — a place that people have never seen before — and to make that place convincing. I think the most difficult aspect of that is not letting yourself get distracted by the toys — distracted by the physical trappings and all the special effects. Hopefully the effects that are there will serve my intent — which was to enhance emotionally and lend credence to the story. To me, the effects and sets in a movie like this should be used, in a way, like the desert in *Lawrence of Arabia*. *Lawrence of Arabia* wasn’t about a sand dune — it was about people. I’m certainly not trying to compare *Outland* to *Lawrence of Arabia* — please don’t misunderstand me — but I think the analogy applies to the extent that it is possible to take a very exotic setting, one where the physical environment is a principal player in terms of its fascination and danger, and yet not surrender yourself totally to it. For me, that was my primary objective — to maintain a kind of narrative integrity. I tried desperately to have everything in this movie work for the movie, rather than simply being an effect that you can see. Because ultimately, if *Outland* is to be successful at all, it won’t be because of the sets or the special effects. It’ll be because it deals with real human beings facing very human problems.”

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Dick Smith
Bran Ferren
Jordan Cronenweth
Richard McDonald
Joe Alves
John Dykstra
Robbie Blalack
Carl Fullerton

image

THE ALTERED STATES OF ALTERED STATES

article by

Paul Mandell

Dick Smith sits leisurely in his den of iniquity, the basement workshop/black museum of his modest Larchmont, New York home. Flanking him are two of his macabre masterworks — a grinning bust of Linda Blair as the venom-spewing demon in *The Exorcist*, and a magnificent rubber casting of one of several mutated heads worn by William Hurt in *Altered States*, complete with oversized glass eye. Reclining in an adjacent chair are the unfinished remains of a foam rubber corpse Smith has been fabricating for his latest project, *Ghost Story*. Aside from such niceties, the Smith household is rather benign and conventional.

A straight-shooting and articulate man, often described as a workaholic, Smith has the distinction of being the true veteran of *Altered States*, having been involved with it from its inception right on through postproduction photography. While that honor might seem unremarkable, it is, in retrospect, a monument to his tenacity in the face of executive instability. The film's title inadvertently points to the schizoid aspect of its production, which can best be described as convulsive fluctuation of ideas preambled by an abrasive clash of personalities. Stormy weather is no phenomenon in Hollywood filmmaking, but when one considers that *Altered States* embraced two major film companies, two directors, and two special effects crews, all with entirely different concepts, it is a miracle that the film was realized at all. The special effects obituary for *Altered States* is grievous, and the editing bins at The Burbank Studios were to become insidious graves for some of Dick Smith's most impressive creations. But in the last analysis, there are moments in the film where opticals and prosthetics were combined for a final effect that transcends both media. In this, *Altered States* has become a thing unto itself.

The Paddy Chayefsky novel (his first) was an immediate source of excitement for producers Dan Melnick and Howard Gottfried, who brought it before Columbia executives in the spring of 1978, shortly after its first printing. The story of Edward Jessup, a young Harvard psychophysicologist who alters his consciousness by suspending himself in a womb-like sensory deprivation tank and learns that he can externalize his hallucinations by combining isolation with psychedelic drugs (and ultimately by mere act of consciousness à la Jekyll and Hyde)

suggested endless possibilities for fantastic filmic visuals. Everyone was very much aware that the genre cried out for such material, and that any science fiction film connecting with reality would have a clear shot at winning a mass audience in a market saturated with space hardware movies.

Gottfried and Melnick set out to hire the best technical talent available, while casting promising newcomers in principal roles. Arthur Penn was chosen to direct, with a screenplay by Chayefsky. Penn's track record was impressive — his bizarre Mickey One won critical acclaim when "avant garde" was still a buzz word, Bonnie and Clyde broke stylistic groundwork in the Sixties, and his Little Big Man was a gem. Joe Alves of Jaws and Close Encounters fame became Gottfried's first choice for production designer, and Michael Butler agreed to be director of photography. John Dykstra, who had just copped an Oscar for Star Wars, would helm the visual effects. And no one was more eager to join forces with Arthur Penn than Dick Smith, who had aged Dustin Hoffman one hundred years for Penn in Little Big Man and worked with the director many times during the days of live television at NBC's prestigious Brooklyn studio. If anyone could physically create a massive mutation of Jessup's entire biological system, it was Smith.

After designing, co-producing and directing the action sequences for Jaws II, Joe Alves decided to pursue directing. He had the Weatherman project in preproduction when funding fell out. Five months later, his agent pressured him to meet with Gottfried, Penn, and Chayefsky in New York. "We all met in Central Park and lunched together at Tavern on the Green. Howard made me a very lucrative offer, and Paddy was extremely friendly at the time; so I started to do the film. We set up an office at Columbia and one in New York. Paddy would come out to L.A. for the meetings."

Alves began working with John Dykstra. He was not concerned about set design as much as the visual effects, all of which had to be sketched out. "That's why they wanted me on the picture, for conceptual ideas. Actually we took it pretty far. I was on it for five months. There were a lot of visual concepts. We made hundreds of sketches. I had Joe Hurley on it, one of two production illustrators. Joe was reluctant at first to get on Altered States — he really didn't like it. But I talked him into it. Ironically, he stayed on the production with Ken Russell, and I eventually left because I couldn't get along with Paddy."

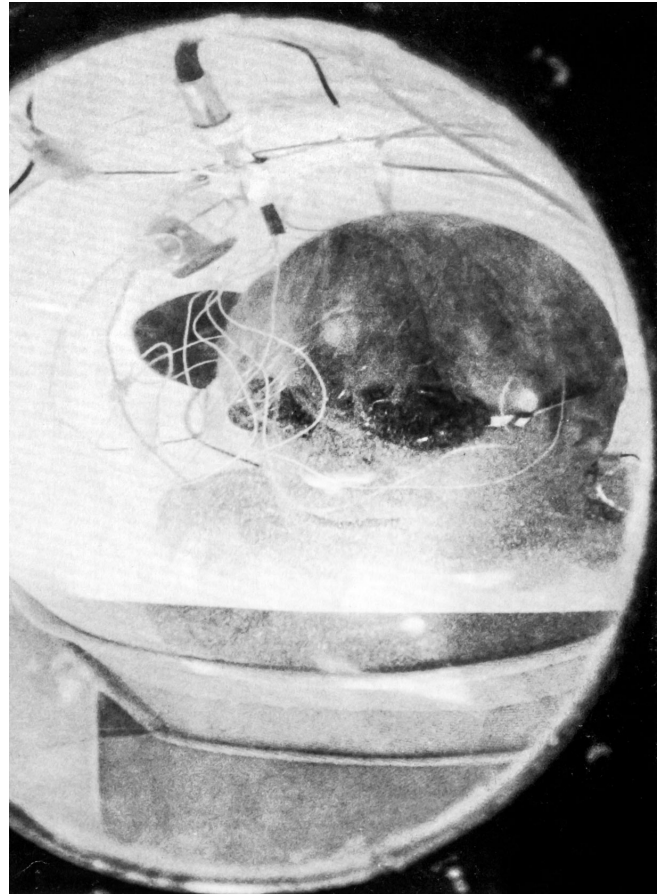
The conferences at Columbia were far from conventional, according to Alves. "We'd sit there at this fifteen-foot table — Danny Melnick, Howard Gottfried, John Veitch (then head of studio production), Paddy, Arthur, and Dick Smith — and we'd have artistic conceptual meetings with all these executives, which I thought was sort of weird." Dykstra found merit in all of this. "We called those nonstop meetings 'The Altered States Tapes,' where we all sat around a board room and, over coffee and Danish, hacked through the whole script, visual by visual. Arthur was very careful that what he had thought up dramatically was interpreted into visuals, enabling him to at least understand what they were going to look like, if not understand how they were going to be done. So we storyboarded the whole bloody thing. Columbia brought in the director and everyone, including the cameraman, when we were still in preproduction, and paid them for being in on all the decisions regarding the picture — which I thought was fucking marvelous!"

Unique as this preproduction ensemble was, the time expended on the conferences actually contributed to the initial collapse of the project. Concepts were tossed around, burgers were sent out for, heads nodded in approval, but nothing seemed to solidify. "John and I would present ideas," Alves went on to say. "One concept that I had for the tank room scene was Jessup's regression to the creation of time, becoming pure energy, converting to crystal form, then to organic form, and becoming himself again. There would be some kind of agreement between Arthur and Dick Smith and John and myself. A week later, my illustrators would come back to the next meeting with some sketches. More dialogue would follow, there'd be more sketches, and this would go on and on. What we were trying to do was devise special effects that were different in the way they were integrated with what was happening, rather than just being effects. I thought the final film had a lot of applied effects, rather than effects with a concept — psychedelic images, instead of what was happening to Jessup. John and I were trying to establish some kind of methodology. The images at the time were a secondary consideration."

Joe Alves and John Dykstra conducted a number of tests on controlled atmospheres using liquid nitrogen as a vapor source. After designing and building a sophisticated smoke-filled environment chamber, they tried to project photo distortions on cloud vapors for a final effect that could be made with first-generation photography. Meanwhile, Alves was also designing the sets to contain built-in elements so that physical effects could be induced. "We were trying to create certain atmospheres, both physically and optically. I experimented with a thing on Close Encounters which I didn't use but wanted to. I ground up colored gels so they could be blown into the set through vents, and then lit them in such a way that they strobed in a very bizarre manner. Yet they were physical — it wasn't an applied effect like putting little dots on an image. It was spectral. So we were playing with the same idea for Altered States. The point was to get away from that 'applied' mentality. Nothing looks better than the real thing. And if we were going to do applied effects, it would only be to enhance physical things."

Dick Smith was in Larchmont when a phone call introduced him to the project. "It started out innocently enough," he said with a wry sense of humor. "They all do. I forget literally who called me, but I flew to Los Angeles to meet Arthur Penn and Paddy and Howard Gottfried. I was given a script. After reading it, my impression was that there wasn't much makeup involved. There was obviously a little apeman, which didn't excite me particularly, because little apemen have been done before. Then there was the 'mole,' as Paddy liked to call it — the mole going up his arm. We talked about it, and I figured that it would have to be a mechanical arm. Then Arthur expressed his conviction that the great transformations in the tank room and corridor scenes should not be done with optical effects, as I had assumed, but would need to be done with physical transformations of some sort. That took me aback! For me, this meant rubber body suits. I was opposed at first, because I was afraid they wouldn't work and would be grossly inappropriate. And I doubted whether I could make a rubber suit that I would be pleased with."

Arthur Penn was so dead-set on using foam rubber appliances and prosthetics, however, that Smith was given no alternative. "During the early conferences when all the effects were discussed, I always found it difficult to direct everyone's thinking toward what was really going



Dr. Edward Jessup's obsession with the scientific aspects of schizophrenia and the religion experience lead him to personal experimentation with a mind-altering hallucinogen which seemingly induces a state of primitive consciousness. In an effort to enhance the effect and study it further, Jessup begins taking the drug in an environment of total sensory deprivation, only to find that his mental excursions into primitivism have triggered a form of genetic regression which begins to manifest itself physically.

to happen, and how we were going to interpret Paddy's script. When we would say that some amorphous blob was doing this and that, it sounded fine in words. But what was it really supposed to look like, and how the hell was I going to do it? Obviously there are limitations to the miracles one can do with makeup. We gradually got to the point where it was decided that the tank room scene would largely be done with optical effects — material that was more in Dykstra's ballpark than mine — whereas the final corridor scene would be done with extensive makeup transformations on both Blair Brown and Bill Hurt. Which meant creating a whole series of body suits and prosthetics."

The initial concept of the end sequence was finally pinned down via an elaborate storyboard drawn by Joe Hurley, while ideas for the tank room explosion scene and all of Jessup's mid-story transmutations continued to gyrate in the conference room. Dick Smith recalled the Penn-Hurley finale. "Arthur planned all the action to take place in the bedroom itself. Jessup was to start out by saying, 'It's too late, Emily.' Then the mole was supposed to go up his arm and kick off a whole series of ripples. He raises his arm and it starts to distort. It goes up to his shoulder and he tilts back into an agonized stance. Then his whole body starts to contort. One arm wraps around his head and begins to clutch and fuse to his left cheek. The other arm connects to the heel of his foot by sinewy formations. Jessup's shape at this point would resemble a kind of monstrous pretzel. Then he would start to collapse down on his knees. That would've been the first suit.

"One point I always raised in the discussions was what the hell happened to his shorts? No matter what you do, it's going to look absurd if he still has his pants on! And if he is naked, do his genitals distort, too? That, to me, was an enormous problem."

The next step was to have Jessup shrink and mutate into a squat, misshapen creature. Hurley's renderings described a distorted lump with a grotesque head, a body covered with fossilized excretions, and a leg that went over his shoulder, with enormous hands and feet. A hole would have been made in the set's floor through which a stuntman could manipulate the mutation, as in the electrocution scene from *The Thing*.

"The crazy thing is," said Smith, "in one of my discussions with Arthur when I was arguing against realistic concepts, I was concerned that Jessup would look simply diseased/ I suggested that it shouldn't look like anything recognizably grotesque, that it should be more abstract. Which is damn hard to do when you're dealing with solid foam latex! So I went to my library and dragged out my edition of *The Elephant Man* and said, Gosh, Arthur, what you're describing is something that's going to wind up looking like this freak.' I thought Arthur would agree with me. But he loved it! He thought it was perfect. So Hurley started incorporating the suggestion of the *Elephant Man* into his storyboards."

And what of Emily? The Arthur Penn concept for her transfiguration/reconstitution ordeal, though not as sickeningly grotesque as Jessup's, did not skimp on bizarre visuals — or make it any easier on Dick Smith, who was repelled but fascinated by the whole idea. "Somehow, Emily was going to be infected. (The final film "explained" this with a gratuitous hand-on-hand scene devised by Ken Russell, who at that point had neither the time nor the patience to toy with anything else. The root of Emily's "infection," however — grossly unexplained in Chayefsky's

novel — can visually be traced back to an idea sketched out by Joe Alves for the vortex sequence, which was curiously discarded along the way.) After making contact with Jessup in the bedroom, she starts to change. First her arm was going to distort hideously; then her face was going to distort. Emily's face was supposed to transform into a concave, bowl-like thing which looked great in the storyboards but was impossible to do physically. The camera would pan down and hold on her dilating breasts, then continue down to her belly, which has been glowing and growing, and which eventually explodes, enveloping her in a tremendous ball of fire. In fact, I started engineering a stomach that would inflate and explode. At that point, the fire was to consume her and turn her body into a cracked, charred cinder, which was Joe Hurley's idea and the genesis of our cracked body suit for Emily. From there, she would have virtually gone into a pile of ashes. Then Jessup would have struggled to reconstitute himself, and he would've gotten to her just before she melted away into a hideous pile of goop! I don't mean to cast dispersions on artistic concepts, but the whole idea seemed pretty convoluted to me."

Smith returned to his Larchmont studio, far from the maddening crowd of the Columbia conference room. His first move was to create a mechanical arm containing the "mole," which was simply a lump that rode on a slot built into the arm and bulged under the latex skin. The lump was manipulated by a rod and a handle. Its limitations for *Altered States* were obvious. Since there would have to be shots showing the mole running up Bill Hurt's arm in full view, Smith considered an adjunct technique of adhering a latex skin to Hurt's real arm and dragging the mole under it using nylon monofilament. That, too, would be a painfully inhibited effect. What was needed was a system of inflatable bladders thin enough to be concealed under a realistic latex skin covering an arm, a chest, or even part of a face. Then each bladder could be inflated sequentially and create a disturbingly realistic ripple effect in addition to a mere bulge. The problem, though, was a total lack of micro-thin bladder technology. For David Cronenberg's *They Came from Within*, physical effects man Joe Blasco literally taped balloons under an elastic skin which fit realistically over the actor's chest. Using an off-camera air pump, the balloons were simply inflated. The graphic nature of Jessup's pre-transmutation body ripples called for an entirely different methodology.

"The only other bladder I had used before was on Linda Blair in *The Exorcist*," Smith pointed out. "But that was nothing; it was routine. The bladder technique we worked out for *Altered States* was revolutionary from a technical standpoint. When we embarked on the project, we discovered that ordinary latex, which everyone would think would be the easiest material to make a bladder out of, was impossible to use. We tried various methods — dipping, molding, all kinds of adhesives to keep the bladder halves together. None were entirely satisfactory. In spite of all the marvelous adhesives available today, there is no modern glue that will



hold two sheets of latex together around the edges and resist air pressure upon inflation. So we found at first that you cannot manufacture a latex bladder thin enough for our purposes. You can manufacture a balloon, but that wouldn't work. What we needed were bladders that could conform to any outline and any curvature of the human body. You couldn't have them wrinkling or folding up underneath the latex appliance — it would show."

Most of the technology finally applied in realizing the bladders was worked out by Carl Fullerton,

Dick Smith's right-hand man on *Altered States*. "When I started on this project, I was afraid, quite honestly, that we'd never come up with a viable method of distending the skin," Fullerton admitted. The answer came, however, almost literally out of Dick Smith's backyard. A neighbor who had been teaching a college-level course in moldmaking had come across a product marketed as "Smooth-On 724." A polyurethane compound used for making flexible molds in sculpture classrooms, the material proved to be extremely elastic and a natural for bladder construction. "I physically made most of the bladders," Fullerton continued, "and went through the process of developing them under Dick's guidance. Without his confidence and relaxed attitude, I'd have never been able to do it. The technology involved was expensive and required more than one point of view in order to make it work. One of the amazing things about the bladder system is its incredible thinness of only 1/32 of an inch, adding virtually no buildup on the skin at all."

Earlier on, Dick Smith had done a rough chest inflation test using a bladder glued to a human subject under a foam latex appliance and rigged to four fireplace bellows. "Arthur liked it and felt it had possibilities. We did that test because in the early fall of 1978, there was no plan as to what we really did want." A subsequent chest inflation test with Bill Hurt in Dick Smith's basement knocked the socks off those present at the Columbia board meetings.

The micro-thin bladder system brought Paddy Chayefsky's mole to life and provided the film with endless possibilities for graphic ripple effects, the most demonstrative being the scene of Jessup in bed watching his entire chest fluctuate — an effect that required seven bladders glued under Hurt's chest appliance and inflated in rapid succession. "The original test was much more exciting," declared Smith. "It was difficult to shoot with his lying in bed, because it was hard to get a good angle and light it properly. The chest effect looked a helluva lot better with the subject standing up. But that's the way it goes. We had all kinds of bladders going in to all kinds of places. Many were never used. We were preparing to inflate the head, the forehead, the back of the neck, and Bill Hurt's cheek. It was a sad case of missed opportunities." Most of this work induced a mass audience gasp, which delighted Smith, although he was miserably disappointed by the photographic handling of Jessup's forehead inflation, barely visible in the bureau mirror. The scene begged for exhibition, as Smith took extra pains in arranging the inflation tube system to blend in perfectly with Hurt's hair. (Tubing for the chest and mole inflations generally

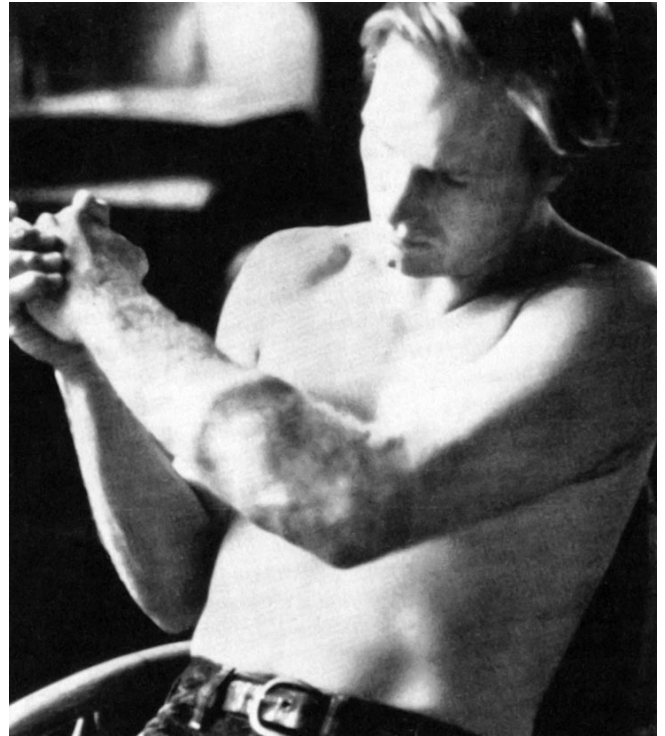
The job of physically altering Edward Jessup fell to special makeup artist Dick Smith, who prepared numerous rough sketches as a means of communicating his earliest thoughts on the final transmutations to director Arthur Penn. As originally conceived, the process was to have started with a series of ripples and bulges which were to appear on Jessup's arm and head. He then begins to contort and portions of his body fuse together into amorphous masses of flesh. Meanwhile, Jessup's transfiguration has somehow infected his wife whose arms begin to shrivel while her breasts and stomach expand until she bursts into a fireball.

ran under the actor's armpits to an off-camera position. Cheek and forehead appliances were glued on to his skin using a special silicone adhesive.)

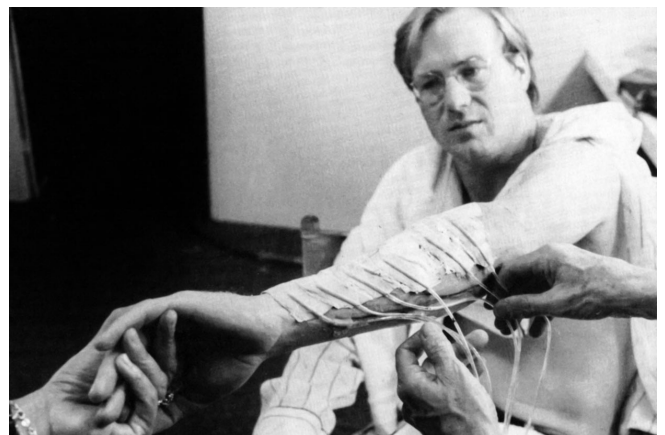
Blair Brown and Bill Hurt made several visits to Dick Smith's Larchmont studio to experience first-time the agonizing ordeal of the body mold process. It was also an experience for Smith who had never worked on such a large scale. "It was a quantum leap forward for me," he explained. "Not only did we have to deal with the artistic design of head-to-toe foam latex suits, but we also had to invent answers to countless craft problems. At first, they seemed insurmountable: separating one bladder from another; repairing leaks; making flat entrances into the bladder; deflating them quickly and inflating them sequentially. And making a seamless latex appliance! This led into making flexible molds out of silicone, which created its own set of problems. We had to design the body suits in sections and have an oven with a capacity of four feet in height. We developed a core which, instead of being plaster, was foam epoxy — light-weight but durable, which resolved the problem of cracks in the molds. We had to reinforce the negative hydrocal [plaster of Paris] molds with aluminum tubing to give sculptural strength. We even had to invent our own gun syringes to inject the foam latex — five of them, holding two gallons each."

Once the myriad technical problems were ironed out, Smith and fullerton applied themselves to Altered States body and soul. The first experimental body suit for Jessup was a makeshift monster consisting of two grotesque arms, and a head in a kind of envelope. Smith made a number of appliances, threw them together, and built this mutation from the waist up, using a friend as a subject. "We filmed a 16mm test, just to get the creature into the ballpark, and made one arm capable of being attached to his heel via a connecting strip." Although it was truly a makeshift monster, Smith's skepticism over using rubber suits slowly ebbed away when the test demonstrated possibilities.

Meanwhile, John Dykstra and Joe Alves called in sculptor David Sosalla, whose job it was to sculpt prototypes of Jessup's metamorphoses for Smith to work from. Smith saw the handwriting on the wall — Sosalla had no working knowledge of practical makeup applications. "The problem was, he was taking orders from Arthur Penn and was not willing to readily accept advice or instructions from me. He was creating these tremendous little sculptures — the first one showed one arm attached to the heel, and so on. But they weren't much help to me. That's the difficulty in having a person who's not a makeup artist doing this — his proportions are dramatic but not anatomically sound. Sosalla's sculptures were realistic in a sense, but he tended to be very heavy on musculature. The limbs were very fixed. They were almost dimensional caricatures of the Hulk. If we had literally transposed his sculpture to human scale, we'd have had people with legs like elephants. It would have been that grotesque. So when we made that early suit, we had to change the sculptural design to have it conform to the human body."

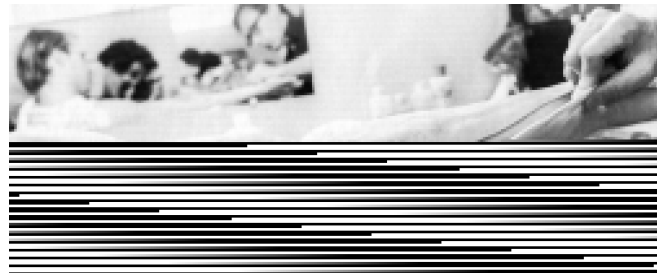


Jessup's first indication that his primitive consciousness is beginning to externalize itself occurs when a ridge of fleshy tissue — which Paddy Chayefsky termed a "mole" — begins rippling up and down his arm.



The mole effect entailed developing a new means of producing extremely thin, inflatable bladders which could be applied in sequence along actor William Hurt's forearm.

Dealing with this dilemma, Smith fabricated his own figurines, carefully keeping within the bounds of Arthur Penn's ideas. They were done in haste, made specifically as a reference for the body suits, and were not as detailed as Sosalla's. Smith began to regret this, since Penn had been judging the direction of the makeup by the dramatic impact of the statuettes and not by their practicality. When the pressure began to interfere with his work, Smith convinced Sosalla to fly east. The maneuver was primarily diplomatic — Sosalla had to see the limitations of makeup for himself before he could be persuaded to modify his designs.



After the bladders and their actuating air tubes were in place, Dick Smith applied foam latex skin, complete with hair, which was then tapered out and blended to match the rest of the arm.

Eventually the design for Jessup's climactic bedroom transmutation suit was completed. Bill Hurt arrived at Dick Smith's workshop and prepared himself for what amounted to instant mummification. Making the mold from his chest up was a nightmarish thought for Smith, as the scheme called for Hurt's right arm to fold over his head and grab his left cheek strenuously. The process had to be calculated and choreographed. "By tests, we figured that Bill would only be able to hold that position for a maximum of five minutes. Normally, applying any combination of conventional casting materials — be it plaster bandage or alginate and plaster — would require a minimum of fifteen minutes. We were also dealing with a two-piece mold for front and back. Bill could not move his position. So how does one make a mold like that in five minutes?"

Smith called it a small triumph of technology and technique. "We mixed white hydrocal with a certain amount of salt and warm water, in order to accelerate the setting time. We figured on a setting of four minutes. Next, we had two teams of two people each — two for the front and back. We vaselined Bill Hurt like crazy and put a big plastic pipe in his mouth. And of course, he had a bald cap on his head. Everybody had a bucket and immediately mixed plaster, which took about thirty seconds. Then we arranged a system whereby we would dip long sections of burlap in the plaster and run them along the top of his arm, figuring on a seam line down the side. We butted these two pieces together — the beginning of the mold halves.

"Then, on the word, 'Go!,' we frantically dipped large squares of burlap and threw them on Bill's face and body! We got it all in two minutes, front and back. The poor guy was completely covered and tried not to panic. After all, it's a traumatic experience to have someone literally pour buckets of plaster on you, knowing that this stuff is going to harden like concrete. And if some disaster happened and we couldn't get him out, we would have burned the hell out of him; because when plaster sets rapidly, it generates heat very fast. Suffice it to say, we were able to pull the mold off in less than five minutes. It worked, which to me was a victory." Once a latex casting was made, it was attached to a previously made cast of the rest of his body. The blend was made at the torso.

Getting Hurt into the suit was another matter, requiring unique modifications. The appliance on the foot where the fake arm connected to the heel had a hollowed sleeve which extended from the ankle upward. Inside the sleeve was a handle that Hurt could grip in his twisted position. A

large cuff was built onto his arm, which blended with the appliance on his arm. He simply had to hold on. When that became unbearable, he could let go and release himself. That was comparatively simple to the huge casting on the top. Trying to engineer an appliance that would fit on Hurt's head and blend with his facial makeup, into which he could slip his arm and slip out of in a second, was a minor miracle of prosthetics engineering.

Smith was eager to show his handiwork to Arthur Penn and Howard Gottfried, who by this time were mainlining Maalox as the start date for principal photography drew nearer. Joe Alves had designed all the sets and construction was virtually completed, but "The Altered States Tapes" continued to roll — slowly. Ideas were still being tossed around like hot potatoes, and often dropped just as rapidly. By far the most complex scenario was that of the tank room explosion sequence, the concepts of which were changed almost daily. The premise was clear enough: Jessup emerges from the rubble and begins to lose his human form; Emily rushes in and tries to rescue him at her own risk. Problem; how to convey that visually.

A great deal of talk was expended on Jessup dissociating into cosmic energy and imploding into a black hole. Since a black hole is an extraterrestrial phenomenon, the idea was fraught with confusion and futility. The intention, now, was to take a more hazardous approach to Jessup's transmutation/reconstitution, by having him turn into some horrible source of radiant energy. Rather than have Emily get sucked into a cosmic time warp, she could easily be preserved by indicating Jessup's radiance on Emily photographically, and having her become whited out momentarily by its brilliance. The idea was carried to her actual contact with Jessup, where the camera would be situated behind her as she reaches out toward the blaze. Her body would "eclipse the sun" as she nears and embraces it. Then the light would fade and Jessup would reconstitute in her arms. The concept seemed uncomplicated and viable. Nonetheless, it was abandoned.

Joe Alves elaborated on his concept for the tank room scene. "After it blows up, Emily was supposed to be integrated into that whole drama, physically. That was my feeling about the maturation of the various evolutionary stages. She was to be reaching and grabbing at these objects that didn't mean anything until they became organic and became Jessup. She was allowing herself to pass that line, to get into his world. Then later, in the last scene, we find out that the experience has infected her, and for that reason, she starts to distort and change."

Dykstra's scheme, though it never developed into any tenable form, dealt with spectral images of various parts of Jessup floating and fluctuating around the tank room, with Emily caught in a kind of ghost-laden void during her attempt to help Jessup "reassemble" thru the power of her love. For this, in conjunction with Joe Alves' idea, Dykstra created his smoke-filled environment and played with projections of images on cloud formations (or a simulation thereof) at considerable expense. Columbia encouraged



Numerous other moles were developed, photographed, and then — in many cases —

Dykstra's work, but bit its corporate lip as preproduction costs began to mount.

Dick Smith recalled some other oddball suggestions. "After the physical effects of glass shattering, overhead pipes bursting, and people getting smashed against animal cages in the lab, Jessup was to rise out of this cosmic garbage in the form of growing crystals. A further permutation had him develop into something that looked like a Henry Moore statue. Once the mud would flake off, the statue would now resemble a gelatinous envelope containing Jessup's shape inside what looked like an embryonic sac. This, too, took me aback, when I considered the difficulties of fabricating a large rubber balloon for Bill Hurt to scrunch into, and how ludicrous it might have been to witness his attempt at trying to break out of the sac. It never went past that stage — thank God!

"I remember Arthur Penn's fascination with Michelangelo's *The Captives*. The image he had in mind resembled a fly-caught-in-amber situation — a figure not quite broken out of the stone. He wanted Jessup to free himself that way. The residual material anchoring him didn't make any sense to me. Again, the image he described was vaguely reminiscent of a Henry Moore-type form. That was the source of having Jessup with one arm stuck to his ankle, and having him try to wrench himself loose. I questioned his logic. Arthur's attitude about such things was that it wasn't important, that one didn't have to be that logical — which I didn't agree with. I'm always disturbed if a science fiction film isn't true to the rules it establishes for itself— if it violates something that should be common sense within the terms of that plot. To Arthur's *Captives* idea, my first reaction would be: 'What the hell was that stuff he dropped on the floor? How could he come back to normal if he's left half of himself in a pile of chips?' I tend to nitpick like that. Arthur used to call me a very good gadfly."

Back in Larchmont, Smith filmed a 16mm test of his son David wearing the completed hand-to-heel suit. "When he put it on, I had my reservations. It still looked like a rubber suit. On film, however, it looked surprisingly good! We shot his reflection in sheets of mirrored mylar and distorted it somewhat — not to the extent of a funhouse mirror; it was subtler than that. It was an idea I picked up along the way, an extension of my proposal to everyone at those production meetings: 'For God's sake, can't we do some optical distortions?' The test just proved it out. I was still pessimistic about the lack of the actor's mobility in this 'pretzel,' but I was now convinced that a rubber suit could work."

discarded. One of the more elaborate ones was designed to produce a bulge on Jessup's forehead, and the second was a filmed cheekbone. To achieve this effect, Smith employed a skullcap and ran air tubes over Bill Hurt's ear to a bladder which was applied to his cheek and blended in with the rest of his face. An artificial hairpiece then covered any remaining traces of the makeup application.



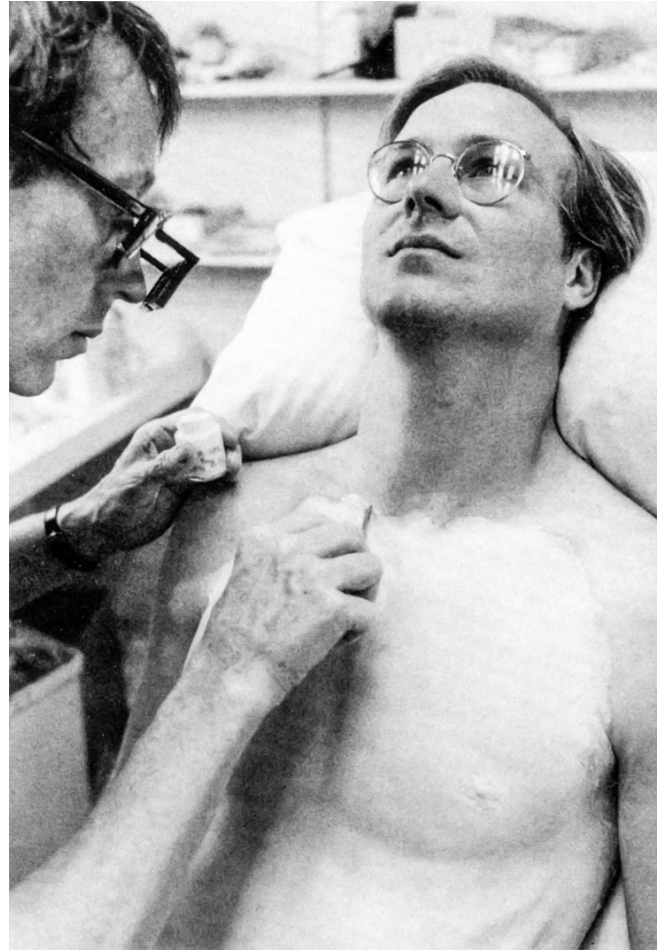
For the sequence in which Jessup lies in bed as his chest is wracked by inner forces, Smith employed seven independently-inflatable bladders affixed directly to Bill Hurt's chest. Over those, a full chest appliance was carefully applied and painstakingly blended.

Concurrently, all hell was breaking loose in California. Most of the fireworks generated from Paddy Chayefsky, who seemed to lock horns with everyone, especially Joe Alves. "It was a difficult power struggle. Paddy was the writer, but he also had absolute authority. If you accomplished something, you'd get his input, but he'd be extremely critical without understanding what you were doing. Paddy would say, 'Why are you going in that direction?' And if you asked him, 'Well, in what direction do you want to go?,' he'd say, 'Don't ask me; I'm only the writer.' There was also a big conflict between New York and Los Angeles. Paddy hates Los Angeles. Originally *Altered States* was going to be shot largely in New York, using all New York people. But there aren't too many New York designers that are experienced in special effects. The elaborate effects film is primarily an L.A. product."

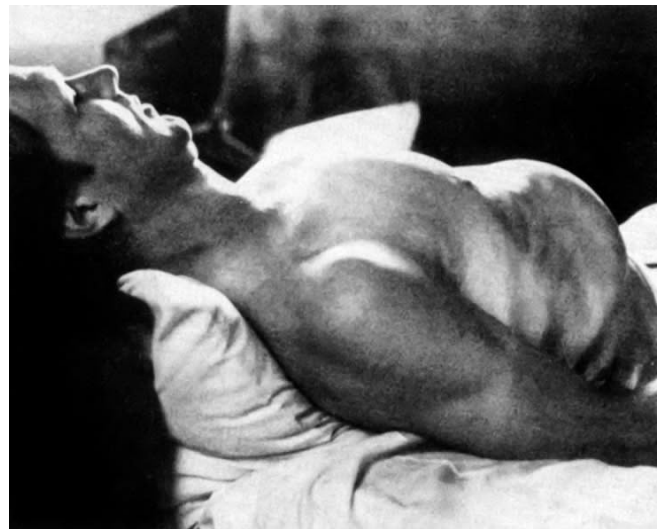
(Ironically, although a handful of bluescreen composites was done in Los Angeles, the key optical effects in the final film were done in Manhattan, the computer effects were done on Long Island, and the special makeups were designed and fabricated in Larchmont—all of which gives the title yet another sly meaning.)

It was more than geography and arrogance, though, that made Chayefsky an irritant at Columbia. Claiming complete autonomy, he flaunted a stubborn streak that seemed almost bent on self-sabotage. "Our conflict was over the interpretation of sets," Alves continued. "Paddy wrote a script about people that live a very academic life in Cambridge, at Beacon Hill — but he'd never even been to Beacon Hill. When I made my sketches, I went there. I went inside the apartments and into those elegant townhouses. Paddy wanted them grungy; I wanted them more opulent and authentic. He was still making Marty; he wanted everything to look like the Bronx."

Chayefsky went too far when his interference obliterated Joe Alves' entire special effects scheme



For the sequence in which Jessup lies in bed as his chest is wracked by inner forces, Smith employed seven independently-inflatable bladders affixed directly to Bill Hurt's chest. Over those, a full chest appliance was carefully applied and painstakingly blended.



For the sequence in which Jessup lies in bed as his chest is wracked by inner forces, Smith employed seven independently-inflatable bladders affixed

which he had incorporated into one of the sets.

"The apartment set was built as a very long corridor," said Alves, "with a window at the end and on the sides, it being a corner apartment.

There were very specific reasons for those windows. We were going to have shafts of morning light coming through them. Distortions were going to come from the actual first-generation lighting as Jessup moved in and out of those light blotches.

We would therefore try to make the transitions look a lot more natural than overlayed optical effects — more in league with the wonderful stuff that was done in *The Elephant Man*.

"Paddy went on the stage and had carpenters take the windows out! Without even discussing it with me or the director! Obviously you don't do that. That's in terrible taste."

Within weeks, production on *Altered States* collapsed. Arthur Penn was given a pink slip, Joe Alves resigned from the picture, Michael Butler followed suit, and John Dykstra was eventually let go. Many felt that Penn had gotten burned for allowing the film to incur what Columbia felt were phenomenal bills, much of which had gone into developing the visual effects with nothing as yet to show for it. "I think if you look at the final budget of the film," countered Dykstra, "you might find out that Arthur was just being honest about what the film was going to cost. I don't know what the final dollar figure was, but I can guarantee you it wasn't too far off from the figure that Arthur originally generated."

directly to Bill Hurt's chest. Over those, a full chest appliance was carefully applied and painstakingly blended.

A concept developed during the Arthur Penn regime had Jessup undergoing a physical transformation at the film's conclusion. Such a scenario would have involved the building of an entire series of body suits and related prosthetics. One of the stages had him starting to contort, with one hand fused to his left cheek and the other attached to his heel. The "pretzel suit," as it came to be called, was sculpted and built by Dick Smith, but never used in the final film.



Another throwback to the Arthur Penn days was a cracked suit for the end sequence in which Emily is "infected" by Jessup and somehow consumed by inner fire. The suit was completed by Dick Smith's small makeup crew, and the cracks were painted with Scotchlite material so that scenes of fiery lava could be front-projected into them. The concept was retained by Ken Russell, but enhanced further with optical effects.

Still, the consensus was that Penn had shown a terminal lack of leadership, and should have been cracking the whip more. "I wasn't very happy about it," Dykstra admitted. "I sure would have liked to have finished the picture we set out to make. We had gotten to know Arthur and he'd gotten to know us. It was wonderful because he would act out parts and get some of the emotion generated within you. Soon we were taking this movie apart without ever having seen it on the screen. We had been seduced by Arthur and he by us, to the point where it became a more emotional thing than simply a practical job. When he left, it was pretty hard to take."

Nevertheless, Dykstra was one of the last to leave the project since Columbia still had contractual obligations to his Apogee effects facility. Joe Alves quit the day after Arthur Penn was fired. "I wanted to quit a week before," Alves said, "but John Veitch knew my work from *Close Encounters* and asked me to hang in there. I thought that Paddy would go back to New York and let us make the movie. But they fired the director instead! Personally, I think they needed a fall guy, and Arthur just happened to be it. What was most ironic was that Paddy thought we were going too far out. I was amused that he was driven to hire Ken Russell!"

Altered States fell into Ken Russell's lap shortly before Christmas, nearly a month after Penn had been given his walking papers. On a stopover in Chicago, en route from Los Angeles to his home in London, Russell was paged at the airport by his agent and asked instead to fly to New York. There he met Howard Gottfried and read the script. Insisting it was too long, Russell began paring it down, added his own input, and later met with Chayefsky to prune it even further.

Dick Smith was in shock. "When I was told that Arthur was dismissed and we were getting Ken Russell, I exclaimed to Howard Gottfried: Good God, he'll change everything! 'We can't possibly start from scratch and still make a January shooting deadline!' Howard was optimistic." naturally, Russell changed everything.

The first change, ironically enough, reversed the makeup priorities back to the way Dick Smith had envisioned from the start. Russell approved of using rubber suits but felt them more



At Russell's direction, a second suit — representing Emily with the skin seared away from her body — was constructed to smooth the transition from her normal state to the severely cracked state, but this intermediary suit was never used.

appropriate to the tank room scene, with optical effects now planned for the climactic bedroom transformation which had come to be known as the end corridor scene.

Dick Smith felt, however, that the cumbersome hand-to-heel suit, now relegated to the tank room, made little or no sense in the new situation. Not only did its advanced mutated state seem grossly inappropriate, but it would be near-impossible for anyone to maneuver about while wearing it in a watery environment. He raised the point with Russell, who agreed; and together, the two worked out a whole new scenario for the tank room action and prosthetic effects. Russell choreographed the scene while Smith absorbed it all, translating the director's verbal descriptions mentally into foam latex anomalies.

The plan consisted of the tank exploding and disintegrating, the room flooding, the principal actors being thrown clear, and Jessup disappearing with the remains of the tank. When the turbulence of the observation room simmers down, the first image of a mutated Jessup appears — his arm elevated from the water, making a gesture connoting helplessness. The arm begins to shrivel and descends beneath the water. After a beat, an ominous shape begins to emerge, dragging itself up. The shape is the deformed head and back of Jessup. Rubber Suit Number One. Jessup continues to struggle until he positions himself on one knee. His right arm is just a stump. Suddenly, his left arm is raised in a frenetic, clawing gesture. He lunges forward, dazed, and grasps his head with his hand. Then the hand fuses to his head. Jessup begins to scream. Rubber Suit Number Two. His body starts to tip back towards the water, and once more, he mutates into a more misshapen form. Rubber Suit Number Three. The hand and head have become one amorphous shape. Jessup is screaming and the mouth has enlarged to enormous proportions. As the scream persists, his whole body begins to lose its shape. Tipped over, his back is almost parallel to the water surface. The camera starts to move in on the figure, and as it picks up speed, zooms in on his oversized mouth. The mouth now turns into a black hole and the camera descends into it. Then just as Jessup seems to be lost forever, Emily struggles past the debris and saves him by the sheer power of her love.

When principal photography finally began in late March 1979, Dick Smith was ordered to have his three suits ready for application in May. Smith left for Larchmont to start the most formidable sculpting job of his life.

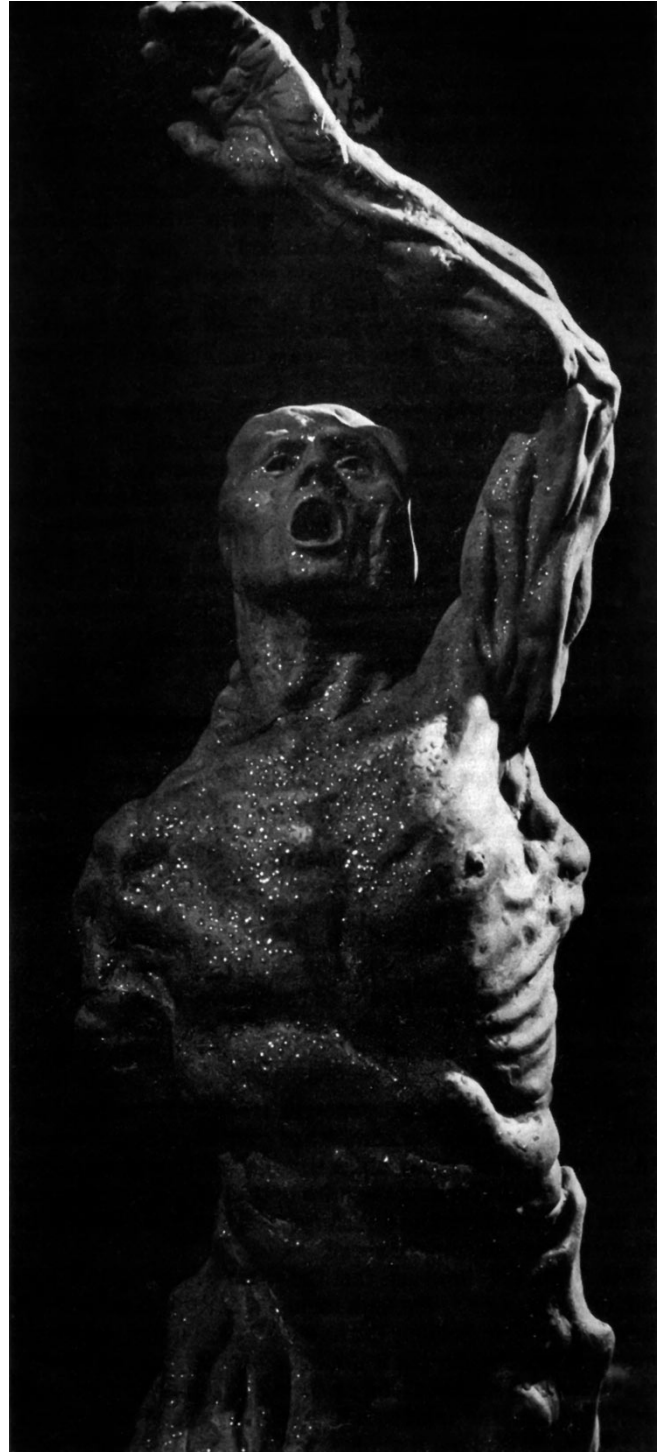
He began by sculpting three fifteen-inch plastilene models, one for each mutation, progressively exaggerating the musculature into convoluted (and ultimately amorphous) bulges and ridges, while preserving the postural gestures suggested by Russell. Then a body mold of Bill Hurt was made, over which Smith sculpted life-size versions of his figurines. The process took months, requiring vats of foam latex and accommodating ovens. The head, torso, and legs were molded and cast separately; the headpieces were worn like hoods. "The sculptural changes that I had worked out for the three tank suits was something that I had never done before. I was trying to sculpt the impression of a dissolution of what I like to call the 'molecular glue' of the figure, the impression of someone who's body is coming apart — not a 'melting man' situation like a hunk of wax, but where it's losing its cohesiveness in a metaphysical way. Of course, that's a contradiction in terms, you know, because you can't really do that in three dimensions. But I was treating my sculpture more in an impressionistic or cubist way than in a literal, anatomical way. I felt that those models that preceded the suits — and the suits themselves — were some of

the best sculptural works I've ever done. Carl Fullerton and I worked day and night on them, photographing everything and sending it out to Ken for approval."

Then, suddenly, the bottom fell out again. Citing the fact that special effects had driven the production budget from \$12 million to \$19 million, Columbia decided to drop *Altered States* completely.

Dick Smith was not even aware at first. "I was sculpting away in New York and the whole thing was kept very privy. Columbia apparently had a gentleman's agreement with producer Danny Melnick not to announce the situation until Gottfried and Melnick had a chance to resell it. It was all very top-secret. I knew something was cooking, because Howard Gottfried kept calling and asking me to send pictures of my work, rather desperately. At that point, i took my three plastilene figure studies of the tank suits, immersed them in a pan of water, and photographed them against a black background, dramatically lit. Those black-and-white photos were sent out. Everyone raved about them. I was later told that my photos were the only things they were able to show Warners to resell the picture!" The sad irony is that two of Dick Smith's suits were ultimately obliterated by computer opticals, and the third was scissored out completely.

Since Columbia and Warner Bros. share the same lot at The Burbank Studios, the *Altered States* reconstitution was relatively uncomplicated. However, all the sets that had been built under the Arthur Penn regime were torn down, a sad and exorbitant waste of money, but something that director Ken Russell insisted on in order to wipe the slate clean. Although Joe Alves was no longer connected with *Altered States*, he found the destruction of his sets hard to swallow and differed strongly with some of the new designs. "One concept that I had to take exception to in particular was that of the first isolation tank, where Jessup's standing up and it has a window in it. The whole point of putting a window in an



Once Ken Russell became involved, Dick Smith's priorities were shifted away from the climactic end corridor sequence — which, it was decided, would now be done with opticals — to Jessup's tank room transformation. Russell directed that three suits be built, each representing a progressively more mutated form. Smith began by fashioning three fifteen-inch plastilene models,

isolation tank is absurd. What you want is total blackness. I designed the original tank room to conform with what was actually happening in the mid-Sixties, when there was a lot of Federal funding for isolation experiments. So I designed the first tank to be opulent. Later on, when Federal funding went out the window, the isolation tank became a makeshift thing. I was gearing my concepts to historical chronology. The new regime couldn't understand why I had made the first tank room so big and modern. Ken Russell thought the sets looked too Space Odyssey-ish and tore everything down. Even the bedroom was torn down!"

For the many who questioned whether a civil relationship could long be sustained between two such monstrous egos as Paddy Chayefsky and Ken Russell, an answer was to come at the end of the first week's shooting. Russell claimed Chayefsky started barking when the director refused to shoot a master shot, and that he objected superciliously to such non-literary details as the color of paint used for the tank chamber and the lighting arrangements. Russell finally went to Gottfried to complain, and the next thing anyone knew, Chayefsky was back in New York where his subsequent insistence that his name be removed as screenwriter resulted in the pseudonymous Sidney Aaron receiving final screen credit. Chayefsky's disassociation from the film gave Russell breathing space, and to all concerned, it meant one less enfant terrible on the set.

Bran Ferren, an electronics genius primarily known for his dynamic stage effects on Broadway, was Russell's choice for overseer of special visual effects. Russell saw him as vital to the success of the explosive tank room sequence. (ferren would later save the entire film from oblivion.) Jordon Cronenweth, whom Russell had first contacted about possibly filming *Valentino*, was named director of photography. Russell's main asset on the film however, was production designer Richard McDonald who, together with the director, mapped out every image for Jessup's surrealistic hallucinations, one of the film's main attractions. McDonald's unconventional, sometimes subterranean, design for such efforts as *Marathon Man* and *Day of the Locust* made him, in Russell's eyes, a natural for *Altered States*. Both share a taste for the bizarre; both are very British.

The Russell-McDonald interpretation of Jessup's first hallucination was actually a distillation of the

from which he could then sculpt life-size versions over body molds taken from Bill Hurt. Once Ken Russell became involved, Dick Smith's priorities were shifted away from the climactic end corridor sequence — which, it was decided, would now be done with opticals — to Jessup's tank room transformation. Russell directed that three suits be built, each representing a progressively more mutated form. Smith began by fashioning three fifteen-inch plastilene models, from which he could then sculpt life-size versions over body molds taken from Bill Hurt.



Dick Smith's plastilene miniature of the final suit. Jessup, now the personification of a primal scream, is reduced to a virtual amorphous blob. When Columbia abruptly terminated the *Altered States* project, Smith's sculptures were about the only tangible indications of the film's potential. Largely on the basis of these photographs, which Smith staged in dramatic lighting after immersing

huge menagerie of images Chayefsky had written into his first script, some of which, while being extremely imaginative, were unsuitable or too

the figurines in water, Warner Bros. elected to step in and take over the beleaguered production.

complicated for the screen. In the script, the seven-eyed ram is first seen with its throat slashed; and while the blood drips down in closeup, the image of the ram was to dissolve out, but the dripping blood was to remain in thin air. Many of Chayefsky's images were rechanneled into the Mexican hallucination — the Daliesque white beach, the switch from red to white clothing suggesting blood and purity. Though it is easily attributable to Russell, Chayefsky himself put heavy emphasis on bleeding Christ images, the severed ram's head, and orgasmic throes of sexual intercourse. One tricky script scene had a beautiful girl washing a white biblical robe in a pool of blood — and despite the blood-bath, the garment remains white. Chayefsky punched up this montage with Jessup's expulsion from his mother's uterus: "The birth scene should be realistic; the fetus is gasping, suffocating, screaming. Camera lens pushes through vaginal tissue — will need discussion with Dykstra."

Russell and McDonald boiled it down to twenty images, as opposed to Chayefsky's convoluted forty-five. Using bluescreen composite photography, fish are matted onto sweeping time-lapse clouds while Jessup floats in isolation, the seven-eyed ram becomes the head of Christ in a bluescreen zoomorphic version of Salvador Dali's Christ of St. John, and the Jessup-Emily copulation element matted against a blood-red sky is intercut with microphotography and flashes of brilliant light. Chayefsky's horrifying image of a cross seering into the chest of Jessup's dying father was retained, but Russell flash-cut such images rather than holding on them, as was suggested in the script.

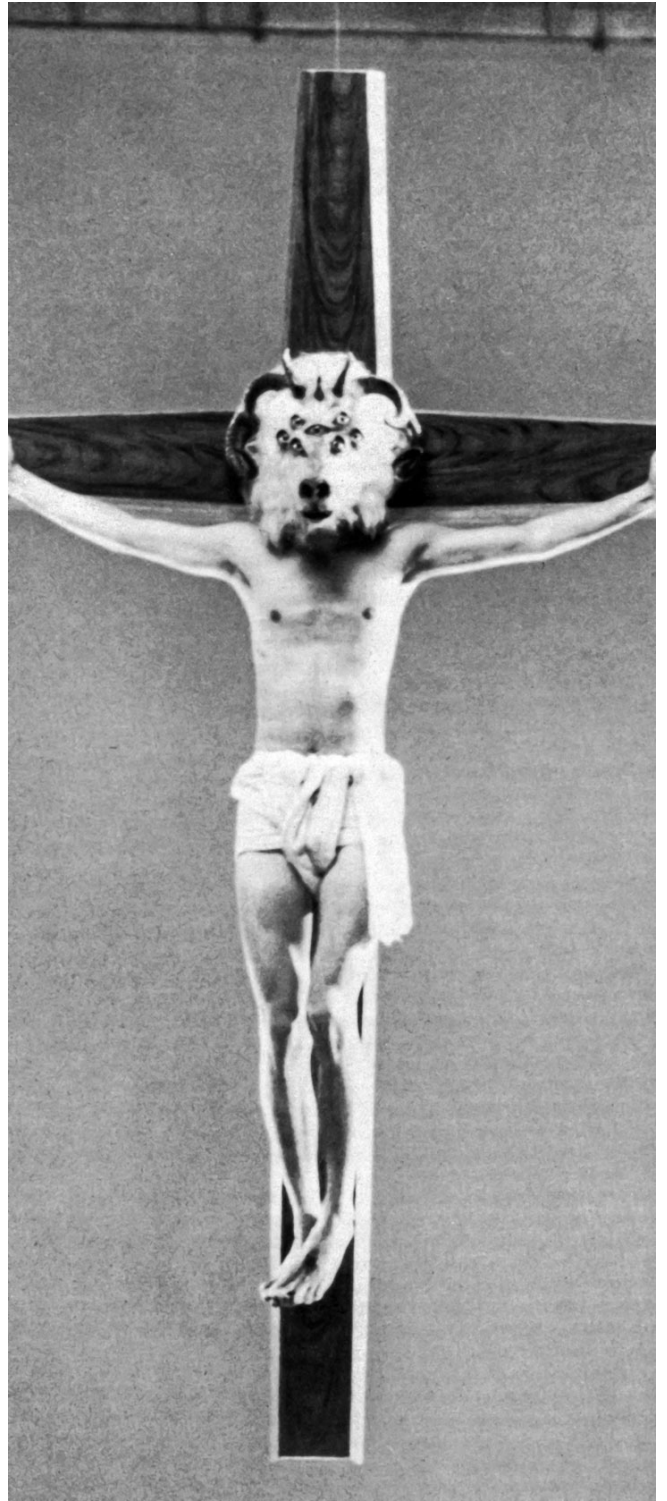
"We made that goat mask and stuck it on someone's head," McDonald explained. "Then we put him against a tiny bluescreen — it didn't go outside the edges of the cross — and we tracked against the studio floor and tilted down, so that he went right out through the top of the frame. (The periphery was later garbage-matted out at Cinema Research Corporation.) Making that seven-eyed monster took a lot of time, in order to get it right and give you the feeling that it was looking at you through all seven eyes. It was really quite interesting to shoot, getting the camera in the right position so that you feel those eyes are projecting out at you. Paddy used it in the script, but the context, how it was used — that we invented. It was Ken Russell reinterpreting Paddy's ideas for film. The idea was to make everything look physical as opposed to illusion. It's like the sequence in the desert, where they're both lying naked and are gradually blown away. That was done for real — it was there. One can do that sequence with tricks — now you see it, now you don't. But we wanted to get into that organic thing so people could see that they're bloody well disappearing on camera. And if those parts of the film have any success, it's only because Ken Russell had the patience to shoot them properly."

Time-lapse cloud photography was used extensively for the first hallucination. But obtaining the right cloud plates became something of a chore. Richard McDonald looked at hours of stop-motion sky footage in various film libraries but could find nothing to suit his or Russell's tastes. McDonald decided to shoot his own skies with a cameraman. And he knew where to go. "We wanted a strong, dramatic sky, one where you can point your camera straight up into the heavens and the clouds pan swiftly right down into the horizon and converge. The only place in

the world where those cloud patterns are more or less a permanent condition is in the west of Ireland, the west of England, Scotland, and the northwest of Spain and France, where the Atlantic comes across. If you go to Oregon, you might stand a chance of a similar formation, but Pacific skies are not the same.

The Mexican sequence was filmed near Chihuahua, at a place called Copper Canyon. McDonald saw it as a kind of natural Stonehenge, where mushroom-shaped rock formations jut out of nowhere. When the crew returned to Burbank, McDonald supervised a crew who built fifty mushroom-shaped stones out of styrofoam. "There was no intercutting between stage photography and location photography; we kept that separate. We shot in Mexico for the scenes of Indians harvesting mushrooms on the hillside, the opening scene where those rock formations dominate, and the closing shot of Jessup walking away with his friend. Everything else was shot on Stage 4."

Jessup's second hallucination is more graphic than the first — a succession of twenty-five organic images. Some of the film's more surrealistic tableaux are woven into this sequence. As Jessup and Emily dine serenely on ice cream amidst a macrocosm of brilliant flowers — scenes inspired by the Freudian works of Dali and Magritte — Russell intercuts with jarring shots of boa constrictors and iguanas, images relating to sexual anxiety and the psychotropic environment. The effect is disturbing, punctuated by a haunting sandstorm. Russell's penchant for zoomorphic images is no more striking than it is here — the first glimpse of Emily lying in the sand is utterly Sphinx-like.



Bluescreen traveling mattes were employed extensively in the first hallucination sequence. A seven-eyed ram's head was constructed and used for a bizarre extrapolation of Christ on the cross.

Bluescreen composites in these episodes were supervised by Peter Donen of Cinema Research in Los Angeles. "Cinema Research is like Van der Veer, said Bran Ferren. "They work on a dozen features a year. The only way you can be good at blue matte compositing is to work it that way. You have to do it every day, so you can keep your chemistry and your colorimetry and printer registration in such a way that it's predictable enough. Even so, there's some sloppy blue matte shots in our film. Some of it is there because Ken likes it sloppy-blue rather than redone! That would drive us up the wall, but what do you do?"

Much of the bluescreen work in *Altered States* is unique in that where matte lines can be discerned at all, they tend to be black rather than blue. Most of this is evident in the first two hallucinations. Ferren explained how and why this was done. "When we deal with color in separate red, green and blue records, as we did in this film, we can pull out the blue record entirely, which will pull any noticeable blue fringing out of the scene. Then you put the blue record back in, but with a softer edge. We'll lose part of it, yet we'll still have enough blue structure to bring back the overall color correction of the face, if there's a person involved. Very often we could reassemble a scene without any blue in it, so that anything that would have been blue turns black. Then you just rebalance the scene until it looks normal again. It can be much less distracting sometimes to see a black outline than a blue outline, if you're going to see any outline at all. I'd say half the bluescreen shots in the hallucination sequences had the blue record pulled completely. We got into maintaining it as a look. Some of it was specifically rim-lit to give the goat a kind of supernatural aura. We actually balanced a number of scenes to take advantage of that effect. But some of it was consequential; it was too expensive to reshoot the scene. There are one or two shots in the film that I would have said are rejects because we blew it. The rest of the stuff was mostly intentional."

Russell employed an entirely different style for Jessup's third hallucination, essentially a transitional montage bridging Mexico and Cambridge. In it, Jessup appears to have visions of eternal damnation. In fact, its Stygian tableau of writhing sinners was lifted bodily from the film *Dante's Inferno*, as part of a conglomeration of images put together by Robbie Blalack. Blalack, an Oscar-winner for his optical composite photography in *Star Wars*, was hired specifically by



Cameraman James Glennon filmed the bluescreen element.



The zoomorphic crucifixion, later composited against a turbulent sky, represents but one of many psycho-sexual and religious images which emerge from Jessup's subconscious during his enhanced psychedelic mind-trips.

Russell for this one hallucination. "The sequence didn't break any new ground in terms of technique," admitted Blalack. "What was most interesting about it was the lack of any particular concern with technique, at least in my dealings with Ken Russell. What he was after was something that had more to do with an aesthetic impact, or a combination of emotional and cerebral impact. So the big problem was to make the images symbolically accurate, as opposed to coming up with a new way to fly a spaceship."

Russell contacted Blalack in February 1980 and asked to meet with him. "We sat down, looked through a lot of production footage, and pulled out a series of images that looked interesting. Assembled on a roll was a bunch of stock footage of lava, lightning, rain, and other weather phenomena. We combed through that and assembled about a hundred and eighty images. Then Ken turned me loose and I started playing with my own library of images. At that point, Dante's Inferno was not part of the sequence. We were looking at some material from Barabbas — a field of crosses. We were also playing with some film dealing with the Crusaders. The basic idea of this sequence was that while he's tripping, he has a genetic recall of all these battles that his ancestors had been through, and all the suffering they had endured. That was one level we were playing with."

The other level concerned the simultaneous fusing of several images in Jessup's mind, relating to his wife, to the Indians in Mexico, and to a series of images from the film itself- celestial explosions and time-lapse clouds. "Essentially what I did was produce a whole series of composites of these different images using a multitude of techniques: bi-pack, bluescreen, matted composites, and double exposures. We were toying with different combinations that appeared to work. We made a hundred and twenty composites for that sequence. Out of those, we narrowed it down to about thirty which worked effectively — images that had a lot of impact, a lot of density. This happened over a period of eight to ten weeks."

Blalack tinted the black-and-white Dante's Inferno footage a deep red, and added a granular overlay to give it a swirling quality. A variety of images was wrapped around it: lava, Jessup's head bulging, his face exploding, fields of crucifixions. Russell's design was to have the scenes move fast enough to prevent unnecessary intellectualization of what was essentially a series of meaningless images. "It ends with a panning shot of a field of crosses. We liked that image; it was pretty bizarre. We played with putting lava behind it, time-lapse clouds, fire and textures. What finally worked out best was lava coming up in one half of the matte, and lava going down on the other half. That seemed to have the right kinetic impact."

Blalack also worked on the sequence when Jessup comes out of his bathroom, opens the door, and sees a chasm of lava. Richard McDonald initiated the scene by placing a piece of plexiglass in the door frame, running ground charcoal and bright orange paint over it, and then lighting it all from below, with steam emanating from behind the set. The mountains seen in the background through his doorway were carved by hand out of polystyrene. Blalack's composite was cut in as Jessup looked down.

"My involvement was a strictly collaborative effort with Ken Russell," said Blalack. "They were really bringing me in to create things rather than doing straight opticals. Actually I enjoyed working on *Altered States* more than any other film I've worked on. He gave me a lot of rope."

Back in New York, Dick Smith was trying to juggle a half dozen makeup problems all at once. The script described Jessup discovering a physiological pathway to an earlier consciousness in pursuit of his primal self and the rudiments of creation. He emerges from the tank as a four-foot ramapithecus.

Ramapithecus had a very monkey-like face. Ken Russell wanted to avoid that. When he cast Miguel Godreau, a Mexican ballet dancer, he instructed Smith to "just make him look primitive." Smith decided to use a minimal amount of facial appliances and use the largest possible dentures so that the dancer's own lips would be incorporated into the final makeup, creating more mobility for the mouth. At Russell's request, Smith gave Godreau blue eyes to conform to the color of Bill Hurt's. The finished makeup was far more human than anyone had anticipated.

Since Smith and Fullerton were still working on the tank suits, the appliances were shipped west to Craig Reardon, who applied them to Godreau with the assistance of Mike Hancock, the regular makeup man on the film. The job took four hours each time, since a complicated chest makeup had to be applied as well. Since the creature was more a human ape than a standard ape-man, it was decided that the hair should be pasted directly onto each section of Godreau's body. (Smith had at first toyed with the idea of using zip-up suits like the ones made by Stuart Freeborn for 2001, but realized how expensive they were and the limitations they had in terms of movement.) Yak hair was first pasted on a life-size form, and from there applied onto the actor in mats. To enhance credibility, it was laid in patterns following the natural direction of body hair growth.

Scenes of Godreau running through alleyways and being chased by dogs were filmed on the backlot at Burbank, but the script called for Jessup's alter ego to escape into Boston's Van Buren Zoo. Smith suggested the Bronx Zoo instead, since it was considerably closer to his Larchmont studio. Carl Fullerton, who got Godreau's makeup camera-ready on location, recalled a harrowing incident. "We were on the grounds where the elephants walk. There must've been half a dozen of them. Miguel was supposed to jump the fence and share their watering hole, forcing his way through them to get to the front of the line. After many takes,



Among the hallucinatory images Jessup envisions after consuming a consciousness-expanding potion during an Indian religious ritual, is a scene involving mushroom worshippers. The two figures, along with an oversized mushroom prop, were filmed against a bluescreen.



In postproduction, visual effects supervisor Bran Ferren produced a series of roscope edge mattes of the two worshippers. These were broken up into multiple random dots, which were then transformed into scintillating stars by employing cross-field filters on an animation stand. The

they decided they wanted a bit more excitement from the elephants, as they seemed bored and sluggish. They weren't giving the performance I suspect Ken Russell would have liked. Anyway, the trainers did something to agitate them, and the elephants started to move — and I mean quickly!

Poor Miguel came up to their knees. He handled himself beautifully, just like a wild animal would do, and fought his way through. When the situation was finally under control, he came back to his human self and screamed: 'Forget this! That's the last take!' He was almost trampled."

Part of Jessup's psychedelic flashback called for a scene in his bathroom shower where he looks down and sees his feet changed into those of his simian self. The action dictated that his toes wiggle. "Originally," said Dick Smith, "it was just Bill Hurt's foot with a lot of hair on it. It was awful. For one thing, Bill's foot is slim and athletic; even with makeup it looked nothing like a primitive man. Plus the water straightened out the hair that was pasted on and it just looked altogether crummy. Ken said he'd reshoot it sometime. I said I'd figure out a way to make the hair waterproof. As time passed, I kept worrying about it. One night, while I was taking off my socks and getting into bed, I suddenly had an idea. It occurred to me that a gorilla really has a foot like a hand, with a prehensile toe. I reached down and stuck my hand under my foot, with my thumb sticking out near the big toe. I thought that if I put a thumb-like appendage on Bill's foot, it would look more like an ape's. The fact that he would have six toes probably wouldn't even be noticed. So why not try it? I did a mock-up and it looked good. Then I made the rubber toe, along with the other toe appliances which slipped onto Bill's own toes. I glued it on to him and lacquered the hell out of the hair. And it worked much better. It was kinda cute. Everyone was amused when he came flip-flopping into the studio."

By May, the three transmutation tank suits were completed. Dick Smith shipped his creations out to Burbank in three large moving boxes, then came out to inspect and prep them. The basic idea behind the Number Three suit was that Jessup was becoming the personification of a primal scream — the black hole idea was an extension of that concept. Smith wondered how a camera could physically accomplish this. "I presented the cinematographer with a casting of the third head and said: 'Can your camera go into that mouth?' Being skeptical and not taking things for granted, I anticipated that there might be a technical problem. That generated the decision for the creation of a big head about four feet across, which essentially became the fourth stage of Jessup's metamorphosis." Smith flew back to New

background was a star moiré pattern with multiple colors. Initially generated as a negative, a variety of the traditional masking techniques were used to negate the multitude of final coloratory images used that throughout the film and matte was then used to induce a glowing effect around the mushroom.



Robbie Blalack was given a relatively free hand in producing Jessup's third hallucinatory montage. One particularly unusual composite was achieved by initially photographing fish — symbolically representing Christ — against a bluescreen. The bluescreen footage was used to produce a hold-out matte, which was run with some film of Bill Hurt in the isolation tank. Then, instead of inserting the fish into the matted out fish-shapes, Blalack used film footage of the schizophrenic girl Jessup had

York and sculpted a more grossly distorted version of the third transmutation. A mechanism with a lever built into the lip area allowed the foam rubber mouth to distort by manipulation.

earlier been studying in the research clinic. The result was a bizarre, constantly shifting juxtaposition of two different faces. One of the most haunting images was produced by optically enhancing stock footage of a field of crosses with waves of fiery molten lava.

Additionally, a large translucent sock was attached to the back to represent an esophagus. Precisely how this grotesque head was going to be used was still up in the air.

Ken Russell was delighted when it arrived. In order to film it more dramatically, he had Chuck Gaspar of the mechanical effects department fabricate a huge mylar vortex that went up to the rafters of the stage. The head was placed at the bottom, which was all part of a whirlpool idea Russell had for the tank room sequence. A circular rig crowned the mylar bag which enabled it to rotate.

"We filmed it several times, quite successfully," revealed Jordan Cronenweth. "It was very effective. We finally worked out the proper proportions of smoke. And we had to redesign the vortex so the seams ran diagonally across the mylar bag. Originally it had seams which were parallel to the floor, but when the bag rotated, the seams appeared to stay in the same place and were visible. So that was changed. The camera, pointing straight down, was on a specially built platform which also rotated, so that the face — which was mechanically actuated — would seem to be rotating, when in fact it wasn't. We had to light it carefully to avoid camera shadow. We were using a wide angle lens and had to be concerned about the shadow of that as well, because we were going as close in as possible. In its final position, the housing around the camera lens was actually touching the face."

How to represent the environment of the black hole? Russell and art director McDonald decided to keep this journey consistent with the organic look of the other hallucinations while conveying a sense of almost extraterrestrial flight. After considering some of the embryonic images derived from Paddy Chayefsky's ultra-graphic first hallucination, Russell decided to structure the sequence around the outstanding microphotography being done by the Oxford Scientific Company in England.

"Actually, they're a bunch of zoologists who spend most of their time photographing minute happenings in human cells and under the sea," said McDonald. "They've developed some superb microphotographic techniques and high-speed rotating prism cameras that can shoot up to ten thousand frames per second. They don't mess with the hurry of Hollywood. Some of our most spacious shots of 'planets' disintegrating were shot on a field about the size of a postage stamp, by interfusing two chemicals which blew each other apart. Great swirling things that seem to go on for miles. The lighting had to be done in an extraordinary way, using special side lights against a black field." Of Oxford's organic images, Russell and McDonald chose shots of cellular mitosis, crystal growth, embryonic action lensed with a fetuscope, an array of protoplasmic micro-organisms, and fleeting structures that looked like organic meteors.

"They were going to use that material to continue the journey into Jessup's mouth," said Cronenweth. "But it never happened." When Bran Ferren and Ken Russell decided that a genuine whirlpool should be used, the image of a mylar vortex became incompatible with swirling water. The entire "Down the Throat" sequence was scrapped — a lamentable casualty,

since the whole idea of a subjective camera making that voyage pointed to the film's most transcendental concept, that of Jessup swallowing himself — a total dissolution of his corporeal existence. The Oxford images were retained and rerouted into the final montage. Dick Smith's oversized spinning head was to see only one second of screen time, in the whirlpool, and at that was all but obliterated by computer-generated grain patterns.

"The problem with that whole sequence," explained Ferren, "was that it changed about fifteen times! The idea of a vortex was virtually a last-minute thing. Originally it was going to be a primeval goo, and then other things which were thrown out one after the other. Eventually we ended up with the idea of doing a genuine whirlpool effect. The normal approach to that idea is to do it with miniatures. I despise miniatures for that kind of thing. There's no way I know of to matte a person into a whirlpool and make it look like the person's really there. So we went for the real thing."

Dick Smith arrived at The Burbank Studios in mid-June. One of the first things he did was dress Bill Hurt in one of his suits and immerse him in a bathtub to make sure he wouldn't bob up and down like a cork. Drying out the suit after a single day's shooting caused some concern, but Smith was able to drain most of the water in an extractor machine and repaint it easily enough. He and Craig Reardon had one terrifying day when the suit began to tear apart as Bill Hurt thrashed madly in the tank water during a rehearsal, but the problem was licked by reinforcing all of the suits with elastic webbing. Shrinkage was another matter.

"The problem was the headpiece, which was worn like a skintight hood. It didn't cover the face — the facial transformation was a series of glued-on appliances that overlapped around the edges of the hood so that it all became homogenous. It wouldn't work out as planned if the suit shrunk — which is what happened! We therefore had to redo some of the facial appliances to allow for shrinkage in the hood. Or we had to dig sections of foam out of the hood area to compensate for shrinkage.

"Just getting Blair and Bill into the suits was a tricky operation. I had to design special slantboards, since they had to get into the suits before we could put on their makeup. In Bill's case, some of the suits required that his arms be confined behind his back. He couldn't even sit in a chair, because his hands were underneath his rear end! So I wondered how the hell I was going to put the poor guy into the suit and apply the makeup and still not have him turn gangrenous?" Smith signed audibly. "We managed."

The three transmutation suits were painted in various shades of sickly fleshtones. Russell had approved this scheme. But as principal photography wound down, he gradually began to deviate from the concepts that he had inherited and modified, and began to go off in his own direction which leaned more toward the optical and metaphysical. Looking at the situation, he came to the conclusion that Jessup's metamorphic energy should be giving off light rays and decided to create a lucite tank that could be lit from below.

"We did a test," said Smith. "The water glowed beautifully. But the suits didn't glow. They merely looked green. We repainted them to adapt to this new condition and boosted the light a bit. That didn't work, either. So Ken Russell decided that we should try something else." Dick Smith's suits slowly but surely were being given a premature burial. Russell ordered the special

effects department to make a copy of the cast of Bill Hurt's body out of soft, clear urethane and put light bulbs inside the shell, hooked to a rheostat for the glow effect. "Ken liked that idea. And it did have an eerie look to it. Then they made another one slightly sitting up, which appears in the film for a few seconds, pulsating from inside the tank. The whole thing was inflated with air like a grotesque balloon, which enabled it to bob up and down by changing the air pressure. It had its knees slightly drawn up, and its head raised and rigged to move in a kind of heaving motion."

Jordan Cronenweth devised a way to make the situation flatter his camera by darkening the lucite tank walls with several sheets of neutral density material. "The combination of neutrals and no light inside made the tank appear black. When the electrically rigged dummy began to pulsate, the effect was uncanny. We then devised a plan whereby the sheets of neutrals would be removed progressively for different shots, until finally you'd see the glowing body through the transparent walls. For whatever reason, Ken decided to lessen the amount of time between the first moment you see that body and the explosion. So a lot of the stages we so carefully worked out were cut from the film."

Russell next decided that there should be a whole series of dummies, getting progressively more abstract. Richard McDonald sculpted them out of blocks of styrofoam with a hot wire and a carving knife. They were huge monstrosities, some of them twice life-size. From them, mechanical effects supervisor Chuck Gaspar made molds and castings out of soft urethane. Gaspar incorporated mechanisms into the larger ones to give them movement in the tank. Some were quite elaborate. "All of them had to have lights inside throughout in order to make them glow," Dick Smith recounted. "That was difficult enough with the mechanisms taking up most of the room. There was also the possibility that they would be in water, which made it even more complicated. They were interesting to look at, because they did glow — they had a translucency and a ghost-like quality. Trouble is, they weren't human and they couldn't act. So the whole project was abandoned." Russell's final solution was to paint all of Smith's creations dead white, which obliterated their sculptural form.

"There was no focus on ideas," Smith lamented. "It was all trial and error. Nobody seemed to know what they wanted for any particular effect. The decisions were all made after the fact. I've often

image

During an unauthorized and unsupervised excursion into the tank room, Jessup reverts to a primal alter ego who terrorizes a janitor, savagely clubs a night watchman, and then flees to the more familiar environs of a nearby zoo.

image

Mexican ballet dancer Miguel Godreau was cast as the protohuman, and Dick Smith devised a makeup approach which would allow him as much facial and bodily freedom as possible.

image

Smith's Hollywood assistant, Craig Reardon, applies mats of yak hair directly onto Godreau's body. The laborious makeup application took four hours each day.

image

An overly-convincing location shot at the Bronx Zoo resulted in Godreau's nearly being trampled by a herd of elephants.

image

A psychedelic flashback in the shower causes Jessup to see his feet transformed into those of his

wondered that if Ken had known at the time that he could have made the suits glow radiantly in the tank room with the techniques that were finally used in the film, he might have stuck to the

primal self. Dick Smith designed the special apelike appendages which fit directly over Bill Hurt's toes.

original plan. There would have been no need to have thrown all that out. I think there was a great deal of the philosophy that: 'We can't do anything that the public is familiar with. Overlays have been done. We can't do anything that's been done before.' In any case, it was the kiss of death for my rubber suits, which I had become wedded to."

For Jordan Cronenweth, filming the tank room was a challenge and a headache.

"Photographically it was a difficult room to work in because it was a permanent set. All the pipes were rigged to bend from overhead. It was virtually a ceiling of pipes, so we had no lighting access to the actual ceiling. The entire tank room set was raised. The walls were fixed, and the floor was made of cement and designed to hold water — which, as it turned out, it never needed to do. The shots of Blair wading through the tank water were done on another set specially built with a transparent floor so we could light the vortex from within in order to represent Jessup's protoplasmic state giving off intense light energy. It was a problematic situation because the pumps creating the vortex were overtaxed. And as the water started to circulate, it began to get noticeably darker on the set, as though somebody were operating a huge dimmer. We soon discovered why. As the water formed the vortex, it created a wall between the lights and the camera, forcing the light to go through a much denser material. The effect was particularly noticeable because we had a chemical in the water to cloud it, in order to prevent the camera from picking up the vortex pumping mechanism. Ultimately, we had to increase the lighting potential by two hundred percent just to get enough exposure!"

Since the tank itself was dark, a TV camera — supposedly recording infrared images — was mounted inside and its output monitored in the observation room. When Jessup's cataclysmic transformation commences, his facial imagery begins to distort, both physically and electronically. "The video distortions were very straightforward," Bran Ferren explained, "in that it was just a collection of film that we shot of Bill in makeup with Dick Smith's airbag technique to bulge the face and move it around. We had that transferred to tape, and then just sat down and started fooling around with a video special effects generator to produce those distorted images." Many of the effects were achieved by level keying and digital image manipulation. Sub-carrier phase-shifting the video signals distorted the colors. Additional colors were matted in, and chroma key was used to add interference patterns. "We also used such sophisticated techniques as putting your finger on the wire going into the special effects generator, kicking the console a few times, things like that."

Ferren also worked out a way to create the spellbinding high-intensity light projections building up to and during the tank room explosion. Jordan Cronenweth desired to have a pulsating form of light rather than a constant flickering, the idea being that as the light builds, it overstresses the closed-circuit TV system and blows it to bits. In the process, high-intensity energy emanates from the monitor itself. "I wanted something different coming out of the TV set. Bran came up with the idea of building two xenon projectors with a rotating, multi-faced mirror in the light path, creating something like a disco light ball, only prismatic in shape. He was able to vary the light intensity, as well as the speed of the rotating mirror. In order to direct this light, we used light tunnels — rectangular tubes with mirrors on the inside, five inches square. The tubes routed the light into the hole behind the monitor. I liked the effect so much, I used the second projector in the tank room to give the illusion of the same kind of light that was appearing on the screen. That was a very interesting situation for me."

Cronenweth's pride and joy was a shot of the observation window exploding, which required a maximum blaze of light in a high-speed photography situation. "I had to go up to almost two thousand foot-candles! Up until then, I had been working in twelve foot-candles. To go up to two thousand and have it match the rest of the scene was something else. We had arcs in the tank room to achieve that intensity, in addition to xenon light and HMIs — everything we could get off the truck! When you're up at those intensities, you're totally saturated with light, and it's very hard to evaluate your contrast. I'm amazed when I think about the early days of color and the enormous amount of light cinematographers had to work with day in and day out."

So much time had been spent worrying about the tank room scene, that no one had given much thought to the climactic corridor transformation. What little thought had been given to the sequence had been directed towards Blair Brown and a vestigial concept from the Arthur Penn days. One of the suits developed before the production shifted gears featured numerous gaping crevices in Emily's flesh, which on the suit were painted in with Scotchlite front projection material. Images of fiery lava were to have been front projected onto the actress, but recorded by the camera only in those areas covered by the paint. The concept was to culminate the original idea of having Emily explode, become enveloped in a ball of flame, and then die down to a charred, cracked-suit stage. Ken Russell thought the process was too abrupt, however, and developed an intermediate step based upon a thumbing through of Gray's Anatomy. The idea was to have Jessup's radiant energy state create what Dick Smith termed a "solar wind," which



The special effects crew opted for reality in the sequence where the overtaxed isolation tank vaporizes and Jessup — or what's become of him — disappears into a swirling vortex. A duplicate tank room was built with a transparent floor made from inch-and-a-half thick plexiglass. Huge diesel pumps disgorged some thirty thousand gallons of chemically-clouded water, which irised turbulently into a central opening in the floor. Several hundred kilowatts of light provided illumination from underneath.

singes the skin off Emily's body, exposing all the veins and arteries held together by a jelly-like substance. From there, the scene would cut to a closeup of her face, and the veins would transmute into cracks, which would then "flow" by projecting lava onto her. Smith made the suit, but Russell nixed it because he claimed it made Blair Brown look too fat. Consequently, most of the attention focused on working out a satisfactory front-projected image for the cracked suit, another ingenious effect devised by Jordan Cronenweth and Bran Ferren.

"Our first idea," Cronenweth revealed, "was to project volcanic eruptions on her body to suggest radiant energy circulating through her system. After some testing, we decided to make our own 'volcanic eruption' by bubbling water with air hoses in a clear tank and underlighting it with various colored gels, while the camera shot straight down on it. We projected that onto her suit and added gels to the projector itself to enrich the color if we so desired. We used maximum projection intensity so that the cracks in her suit were virtually alive! Also, we threw the image out of focus so it wasn't so specific." The projected image was so bright, the team had to devise a way to prevent the light from spilling all over the set and minimize return. Barn-dooring the projector wasn't enough — the walls and surfaces perpendicular to the lens were actually painted black. "In some of her shots, the walls are visibly black; but there's so much going on, you're not conscious of it. There was some spill around her body, but we felt that it looked like an extension of what was happening to her, so we let it slide. It's quite a shot to behold, even without all the optical enhancement. In fact, eighty percent of what you see on her is front-projected image. It was a good enough effect to stand on its own. I believe the enhancement was necessary only to carry through a visual continuity between her and what was happening to Bill. I thought that was the most interesting thing we did on the picture."

But what was to happen to Bill Hurt in the corridor? That was a question that kept gnawing away at Dick Smith's grey matter. "When principal photography began, the plan of action kind of stabilized. We had a few meetings with Ken before he started the cameras rolling, but out of necessity they were somewhat rushed. He was just too busy then to discuss anything further. Our meetings and ideas came to an abrupt halt. Much of the time was spent discussing what to do with the tank room scene. That was momentarily resolved and left up to me, so I had a clear go-ahead on my plan for the three suits. But nothing concrete had been decided for the final scene. In fact, nothing had been discussed! Ken said we'd deal with that later. It was said, however, that: 'You, Dick Smith, will not have to do anything further for that scene with Bill Hurt. We will do it optically or figure out something.' Being a skeptic and a worrier, that bothered me. The closer it got to the end of principal photography, the more nervous I got. I said to myself: 'Sure as shootin', they're gonna wind up demanding something for this scene!' So I kept buzzing them about it. nobody seemed too concerned. I had to think of something."

image

The earliest indications that Jessup is in serious trouble come from the closed-circuit television transmissions originating from within the tank. Bran Ferren used a special effects generator, chroma key, and other techniques to produce a chilling montage of distorted video images.

Dick Smith's determined attitude led to one of the more bizarre untold tales behind the making of *Altered States*. During this reign of apathy, Smith had become acquainted with veteran makeup artist Maurice Seiderman, who among other things had created all the makeups for Orson Welles in *Citizen Kane*.

"I discovered that Seiderman, as a hobby, had developed some amazing microphotography using a form of crystals to make paintings directly onto photo transparencies. Using a cat's whisker, he was actually able to paint — under a microscope — weird crystalline formations using a special compound that Seiderman keeps secret. It's not paint because the colors came from the crystals, not pigment. The colors are extraordinarily brilliant, and the marvelous thing is that they're all different. He could take a transparency of an arm, put it under the scope, and make it look as though it were blazing with atomic fire!

'Phosphorescent' would be too weak a term; it was luminous and organic. In fact, one of his slide paintings almost looked like a man in a kind of weird, impressionistic blaze. My immediate reaction was: 'My God, this could be useful' Seiderman said he could animate this stuff and turn a man into radiant energy. He was literally going to do frame-by-frame animation under the microscope by rigging a pin registration block under it and applying this microscopic crystalline stuff directly onto the film. In my mind, this would save the end sequence from eventual disaster. And Seiderman said he could do it quite fast."

Smith presented that one impressive slide to Ken Russell and had Seiderman come out and meet him. But the personalities clashed. Seiderman expressed himself very strongly, and Russell was skeptical about his being able to handle it all by himself. "What was needed was someone to say: 'Okay, we'll give you a certain amount of money to produce for us thirty second's worth of demonstration footage.' But that didn't happen." Undaunted, Smith pursued the idea further. Back in Larchmont, he posed Carl Fullerton in a number of positions Jessup might assume in the final scene, and photographed him with a still camera. He then put clear cels on them and painted a series of progressions, trying to simulate the effect of Seiderman's work, even though it was impossible to do so with ordinary paint. "I first did this with Carl's outstretched arm, as though he were saying, 'It's too late, Emily.' Then instead of having the mole go up the arm, I painted an effect on the overlay in the manner of an animated cartoon — first showing the effect creeping up his arm, taking over his whole body, then having him literally explode into this radiant energy form, which would then lash out and burn Emily. I

image

Dick Smith and assistant Carl Fullerton make a head casting of Blair Brown.

image

Ken Russell ran a test of Smith's Number One suit in the bottom-lit tank. However, since the source of the intense illumination was supposed to be Jessup's metamorphic energy, and since the suit itself was incapable of glowing, Russell elected not to use it in that context.

image

Smith applies final touches to the Plumber Three suit, which was eventually selected for use within the transparent isolation tank, despite Smith's conviction that its advanced mutated form was inappropriate to the situation.

image

The Number Three suit as it appeared in the tank before optical enhancement.

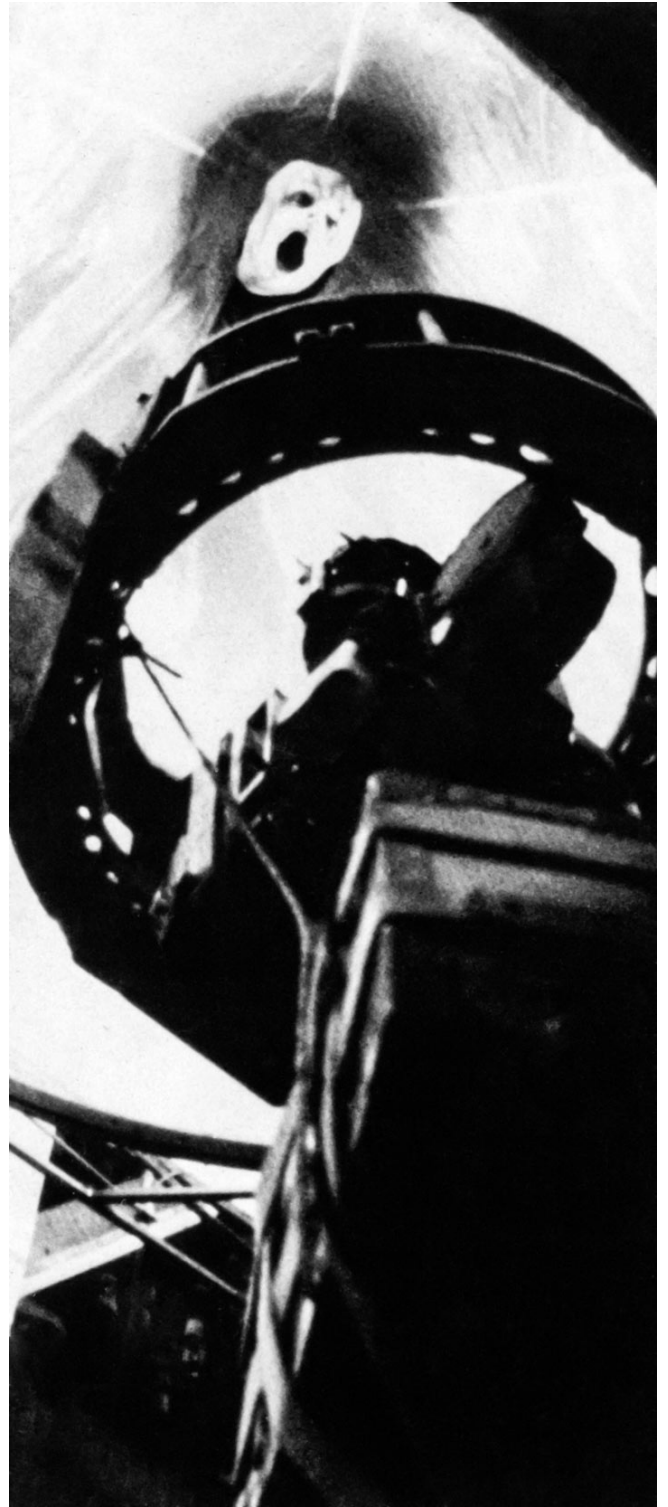
really didn't expect Ken to accept the idea in total, or even in part necessarily, but I hoped it might act as a catalyst. I wanted to get their thinking out of limbo. I wanted them to come to a decision. Also along the way, I ran into an artist who had done a lot of experimental work with paintings and distorted images. These, too, were quite interesting and appropriate, and so I took several Polaroids of them. Then I sent all of the photographs to Howard Gottfried and asked him to pass them on to Ken."

image

An early concept called for the camera to truck in on the Plumber Three suit and go right into the distended mouth. Since the mouth was not large enough to accommodate such a plan. Smith sculpted a much larger version of the third transformation head and equipped the lip area with a lever mechanism so the mouth could be manually distorted.

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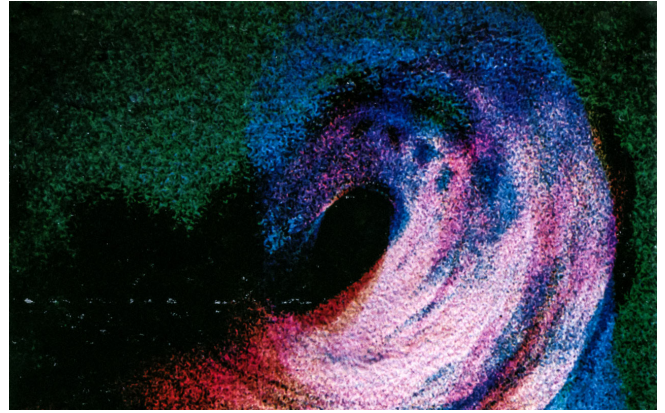


An elaborate mylar vortex was built with the enlarged head at its epicenter. The camera would then be mounted on a rotating rig and lowered inside. however, when the alternate tank room vortex came into being, the mylar version was scrapped.

On Smith's subsequent arrival in Hollywood for the next production meeting, he was appalled to find the photographs still sitting on Gottfried's shelf, untouched. Smith presented them to Russell himself. Russell appeared polite and interested, but the idea refused to spark any enthusiasm. Smith saw it coming. "What I feared, then happened. We were weeks away from shooting the final scene, and they came up to me and said, 'We've got to have something makeup-wise.' And damnit, I knew this was going to happen! Emily was all set to burn up and they were still groping for a solution to Jessup. In fact, it was shocking to realize that the final scene was determined by Ken Russell telling me: 'Well, I think what we'll do in the hallway is use the shrinking arm suit which was originally meant for the bedroom scene which was then changed to the tank room scene which will now be Jessup's final change in the corridor scene. We'll put him in the Number One suit. (Can you have it ready by tomorrow afternoon?) And I think we'll have him bang against the wall, then she can stagger in and fall down...' And Ken literally wrote the entire hallway scene on the spot and threw it at us without any kind of warning. After months of planning and changing things around, this is how the final solution was arrived at — by taking disparate pieces that were left over and weaving them together.

"Ken shot the scene with Bill Hurt pounding against one wall — and that's all that was going to happen. Then he got the idea of having his image transpose. He was going to have Jessup go from the suit to his naked self, cutting back and forth as he pounded on the wall. Then he decided that it would be better if he pounded on the floor. So he got poor Bill, whose hand was already bruised like hell, to do it all over again."

The impending scenario of doom Dick Smith had dreaded for months was about to become a reality. "Bear in mind that even at that point, no one had any idea that there would be any optical effects involved. It wasn't filmed for optical effects. It was more like: 'Well, this is the best way we can shoot it. Then we'll take it to the editing room and see what the hell we can do with it.'" When the corridor scenes were edited and scrutinized in the screening room, however, the climax to Ken Russell's explosive, metaphysical production of *Altered States* looked painfully terrestrial. When Russell and Gottfried realized their film was in big trouble, the flag went up. "I was rather upset that they didn't take Maurice Seiderman up on his idea," Smith

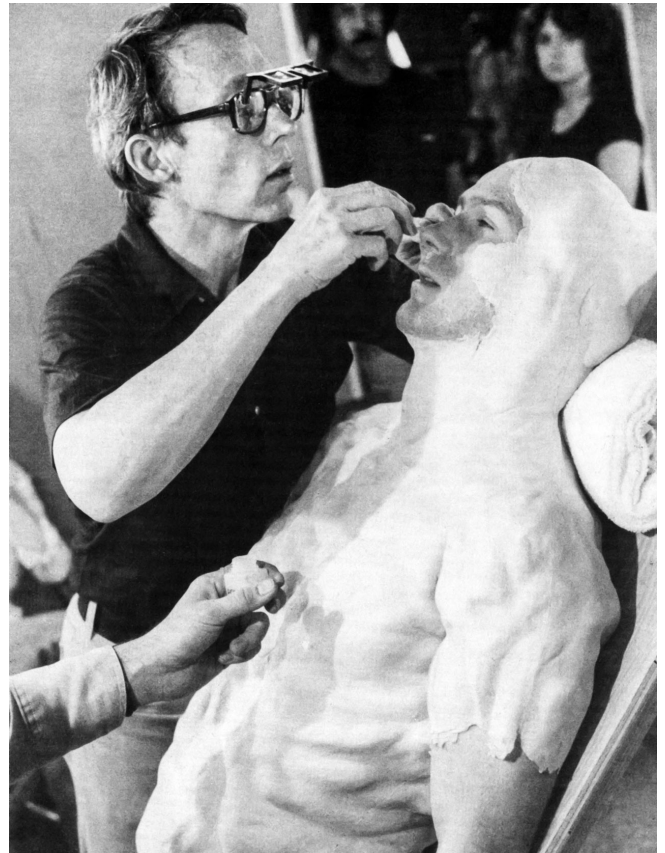


A fleeting glimpse of the oversized head was retained, but heavily enhanced with computer optics.



For another segment of the tank room transformation, mechanical effects supervisor Chuck Gaspar made a series of methane quasi-human monstrosities which were lighted from within to produce a pulsating glow effect.

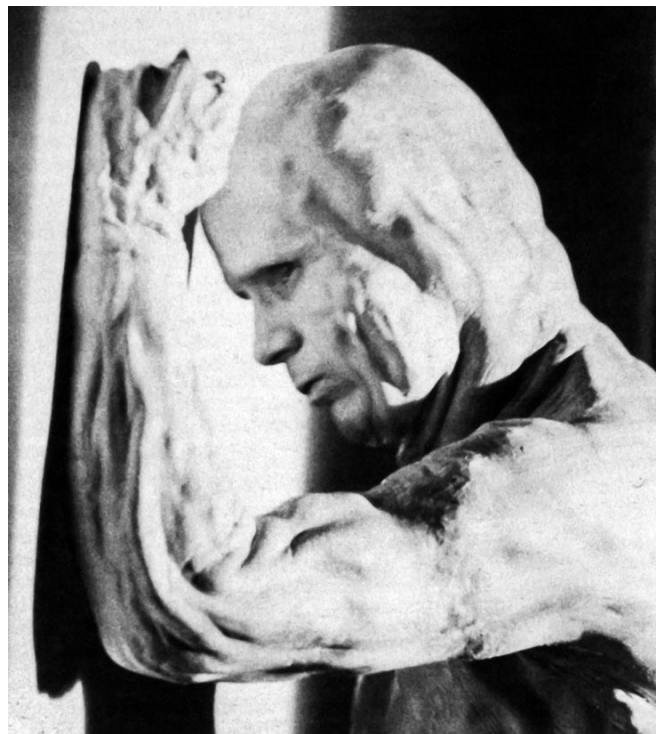
lamented. "The effect would have been staggering. I thought it had possibilities of looking like something no one has ever seen before. But they just didn't believe in him. I had gotten to know him personally and had seen what this guy could do. The problem was, no one could make up their minds. They were waiting for lightning to strike — for something to land in their laps. And it wasn't happening."



A last-minute decision was made to use Dick Smith's Number One suit for the end corridor sequence. The suit — including the head piece which slid on like a skin-tight hood — was applied in sections and then carefully joined together.



A last-minute decision was made to use Dick Smith's Number One suit for the end corridor sequence. The suit — including the head piece which slid on like a skin-tight hood — was applied in sections and then carefully joined together.



Regrettably, the suit, which had been designed and constructed for use in the dimly-lit tank room environment, proved painfully inadequate when thrust into the end corridor sequence.

Then lightning came — in the person of Bran Ferren. Lightning, in fact, was Ferren's business. An electronics wunderkind, Ferren had formed his first company at age thirteen, designed security systems, put on light shows at New York discotheques, and while at MIT was given a grant to analyze the emotional content of sounds and speech using computer systems — a study which predated voice stress analysis for lie detection. A prime mover in bringing spectacle back to the Broadway stage, Ferren's sensory bombardment of storms, explosions, swirling fog, image projections, life-generating lab equipment and wall-to-wall music have flabbergasted audiences in such big-budget productions as *The Crucifer of Blood*, *Evita*, and the recent, ill-fated production of *Frankenstein*, by far the biggest visual effects show ever in the history of theater.

"For the end of the picture to work at all," Ferren explained, "it had to be the big topper that outdid everything else we'd seen up until then. Unfortunately, people in foam rubber suits with a lot of makeup on them didn't do the job. And that's no reflection on Dick Smith's work. All the suits were really based on much earlier concepts, and were originally to have been filmed in totally different locations and with totally different lighting. So it wasn't his fault, but the fact remained that the stuff just didn't look good. The film needed a far more dynamic ending than just physical form changes. The problem then became what to do about it, and that was kind of pushed aside into the area of postproduction opticals — my area. Frankly, it was really never my intention to do the postproduction work. Originally they asked me to do a lighting effects sequence. So I went out and did it, and apparently they like it. Then I was asked to take over the visual effects direction of the film, and I agreed. About a week later, I found out that I was replacing John Dykstra. I didn't even know that John was involved in the film until after I was hired. I asked to see



In postproduction, Bran Ferren devised a concept whereby Jessup would appear to be dissociating into molecular energy. For the earliest shots in the sequence, he had color separations made from the stage photography and then altered the final appearance by reassigning contrast relationships and color values.



For the energy effect, Bill Hurt's image was isolated with a computer-assisted rotoscoping

what he'd been doing, and they said: 'We don't want you to see what he was doing. We want you to do it all from a fresh perspective.' That sounded tedious, but I said, 'Okay,' and so I oversaw all the visual effects during principal photography. Then I was asked to stay and handle the postproduction work. After 145 days of photography, I wasn't really in the mood, but it was something I hadn't done before and I thought it would be a nice way to follow through on things."

process and then replaced altogether with computer-generated pixel patterns.

Ferren elected to establish his postproduction command center in New York where he could alternate between his own elaborate research and development lab — whimsically called Associates and Ferren — in East Hampton, Long Island, and offices at The Optical House in midtown Manhattan. The end corridor sequence became an immediate and pressing concern. "As we worked through that sequence, we had to wrestle with two very fundamental questions: What, emotionally and physically, should be happening to the characters? And given the photography that we had, how were we going to go about doing it? The basic concept of having Jessup undergo this cosmic metamorphosis and start breaking up into molecular energy was an idea of mine that everybody seemed to like. From there, it was a matter of figuring out how to do it."



Since the end corridor sequence was to adopt a more metaphysical look, it was also decided, for consistency, to go back and enhance the tank room transformation scenes as well.

image

Visual effects supervisor Bran Ferren.

The first problem was to isolate Bill Hurt's image on the film so it could be dealt with optically. Reshooting — with bluescreen, or otherwise — was not an option, since by then the production had wrapped and sets had been struck. That left some form of rotoscoping as the only feasible alternative. Since the sequence involved a lot of movement and image blur, standard hand-drawn rotoscope techniques would not have produced a satisfactory result. "It's not readily possible for an artist to adequately draw a sequence of roto-frames where an object is either blurry because it's in motion, or where it matches the background very closely in color and density. There's just too much guesswork involved in deciding where the line ought to be; and because of the lack of visual correlation processing power and storage in the human brain, one can't reliably produce a smooth transition from frame to frame. So we developed a computer-assisted rotoscope system."

Translating the photographic image into a form the computer can deal with is the first task involved in the creation of any such system. Associates and Ferren used two basic approaches, depending upon the desired output. The more complex involved making black-and-white color separations from the production photography providing red, green and blue color records, and then digitizing them on a flying spot scanner. The high-resolution scanner (6000-line) broke each image down into a sequence of numerical intensity values, which could then be used by the computer to differentiate, quantitatively, between picture elements. For more straightforward applications, the film was projected, frame by frame, onto a graphics data tablet. The data tablet provides a means by which two-dimensional images can be converted to x and y coordinates for use by the computer. Employing a process not unlike traditional rotoscoping, the computer artist uses an electronic pen to manually trace from the tablet whatever figure or object is to be matted, giving the computer — in the case of *Altered States* — a digitized outline of Bill Hurt as he progressed from one frame to the next.

"You could use computers to digitize the whole image and make its own determination from frame to frame," Ferren explained, "but we developed this abridged technique to short-circuit the whole process and take advantage of the rather significant processing capability of the human brain to determine what, in fact, you want the computer to look at, without having to store all sorts of superfluous information you'd just have to weed through later on. What's nice about the system is it allows you to produce a rotoscope matte which is dazzlingly smooth in comparison to any you could easily produce by hand, and it does that by using the computer's ability to look a few frames ahead and a few frames behind, and then adjust the hand-traced

image

Jim Hedges at the high-resolution plotter used to produce the computer-assisted rotoscope mattes.

image

Ferren's postproduction unit also produced insert photography from a steel replica of the Mexican cave opening which was positioned over a miniature oxy-acetylene blast furnace. These images were then optically enhanced and intercut with the video distortion shots and some of the hallucinatory montages.

image

Bran Ferren behind an advanced computer-assisted camera rig, developed independently but used to produce fluid post-production film elements that would otherwise have required tedious hours of manual plotting on an animation stand.

roto line to come up with a totally smooth movement of the outside matte boundary. The boundary line may not, in any given frame, be in precise conformance to the picture, but it moves in a smooth way so you don't see what is typical of rotoscoping when you have a hard edge — which is that that edge is jiggling all over the place. Once we've previewed our computer roto-matte on a high-resolution CRT (cathode ray tube), we output the data to a digital plotter which physically draws the outline onto frosted mylar animation cels. Then, by employing grad mattes — which, rather than being high-contrast black-and-white, are continuing variable density — we're able to create a matte which is, in effect, out-of-focus and blurred. Since hard lines don't relate well to things in rapid motion, we developed this technique to get smooth movement without jitter or objectionable outline."



Rapid cutting was employed throughout the final transformation sequence as Jessup pounds savagely on the walls and floor in an effort to regain his corporeal form. In the film, the three frames shown here had only a single frame between them. In the first, Jessup's progression into an energy state was made more pronounced by printing the color records out of sync, an effect which suggested both speed and dissociation. Then, at the moment he strikes the wall, Jessup snaps back to his former self for two frames, then begins slipping back again into an altered physical form.

Once a satisfactory means of isolating Bill Hurt's image from the rest of the frame was achieved, the problem still remained of what to do with that image to produce the desired visual effect. Ultimately, that image was to be cast aside entirely and replaced with something altogether different. "Dick Smith's suits provided the original changes in geometry that you see for the first few seconds," said Ferren, "but from the point where you see the red, deforming man slide down the wall and break up into little grain particles, you're not seeing any of the original photography at all. Instead, the scintillating patterns were derived from artwork that was generated via computer graphics and optical printing. What we did use the film image for was to create kind of a synthetic model of the figure in computer memory. This is not full three-dimensional modeling in any way, shape or form, but rather a means of taking shadows and highlights from the image — things that relate directly to physical characteristics under normal illumination — and use density values to build up a pseudo-three-dimensional representation.

"Then we went into our pixel production program. Pixels are what we called all this energy particle stuff. Keep in mind, our definition is a little different from the real-world computer graphics definition, in that we're using 'pixel' to refer to our particular elements that are being used to assemble the mattes, rather than the smallest definable object anywhere in our entire graphics field. By sitting down at our graphics terminal, we can start entering our pixel parameters — size, shape, movement, density, and so on — and once they're in computer memory, our operator can create an almost unlimited number of dynamically changing patterns. Then we tie this into our other programs — like the pseudo-3D modeling one, which was very important. If we had just matted in an image, it would have looked like either a bluescreen matte or a chroma key two-



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dimensional cutout. Instead, the figure we inserted was dimensionally modeled so that the grain patterns conformed to the original body in texture and depth. As the figure turned, the pattern got denser and the edges got brighter; so it actually appeared to be wrapped around him rather than just being matted over him.

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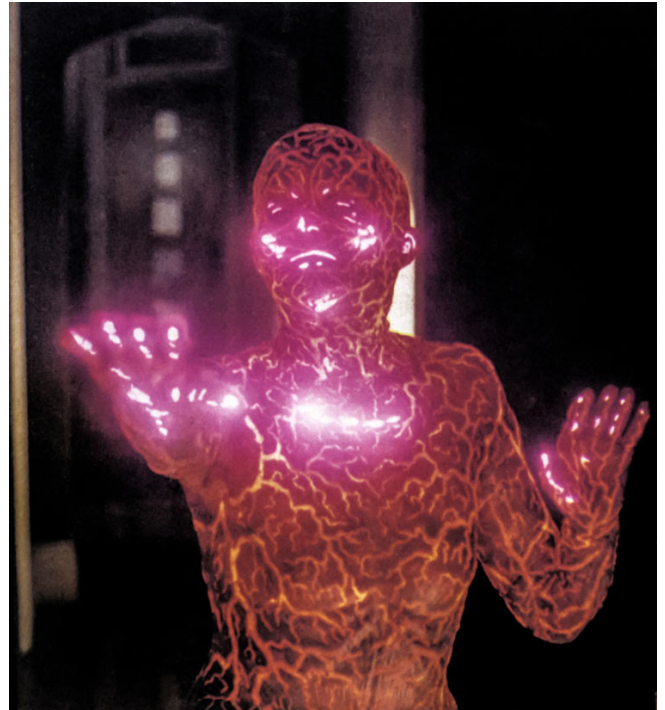
"As we're working all this out, we can preview what the image is going to look like by watching the pattern build up on a graphics display unit and see how it performs. When we have what we want, the operator instructs the computer to output the data onto our high-resolution, extremely precise digital plotter which draws the pattern directly onto frosted mylar animation cels, using a Rapidograph pen. So basically, it is putting out all the little dots and jiggles that go inside the roto-matte area, whose boundaries have already been determined through the other program. Then the cels are photographed on the animation stand. The animation stand is also computer-controlled, and can be governed by the same master program in terms of movement, rotation, size and other things — such as adding glows — that may need to be done that couldn't be conveniently accomplished within the program that's actually graphing the pixels. So the computer is really drawing the artwork, and the artwork is then photographed.

"Why, you might ask, are we doing this rather than using the scanning system to go directly out to film? Well, there are several reasons. One, for us it works better. The problems of conforming geometry precisely are much simpler on a high-resolution plotter because over a twenty-by-thirty plotting area, you have a guaranteed half-thousandth or quarter-thousandth of an inch positioning error factor — that's dead-accurate registration. You can also take what the computer has drawn and continue working with it. If you want to modify it a bit — get rid of a few dots, or add a few dots, or make it a little hazy around the edge — you can just draw it in, and yet you've still taken advantage of all the computer has learned how to do. So the system is extremely accurate and wonderful, provided you don't initially need gray scales. Obviously it's going to be a high-con representation, because there are no gray scales with the digital plotter — it's either on or off."

Coloring the pixels was done on the optical printer, requiring multiple passes to build up the desired color image. "Since we were dealing with straight high-contrast black-and-white patterns rather than continuous density changes, we weren't able to take your basic red, blue and green and combine them in subtle amounts. So if we wanted to produce a pinkish orange-yellow, we had to generate pinkish orange-yellow filtration and then do one entire separation run just for that. Often we'd have to generate a dozen or more specific color filtrations and a separate matte for each."

Even after Bill Hurt's rubber-suit image was roto-matted out and successfully replaced with the counterfeit pixel image, Ferren's involvement with the end corridor sequence continued. Graduated color density mattes (or grad mattes) were used throughout in order to manipulate the lighting of the room in the original photography, to color-correct, and to prevent matte lines from forming. "The grad matte system gave us much greater control than simple black-and-white high-contrast mattes. We used a couple of techniques to generate them. One involved

taking a series of high-con black-and-white lines produced on our plotter and then photographing them slightly out-of-focus on the animation camera. This builds up a variable-density gray, depending upon how close together the black lines are packed — sort of a linear half-toning process. Another way, which has nothing to do with computers, is to photographically derive them from artwork or selected optical elements. Grad mattes were my great fix-alls. When the background was starting to get contaminated and the blacks were turning into grays, I'd put in a density grad matte to take down the blacks — which is one of the reasons we ended up with some astronomically big opticals. The worst one used forty-seven elements."



Once Jessup's figure was fully transformed by the computer-generated imagery, it was decided that Emily should also undergo some sort of optically-induced change. Although the front-projected cracked suit produced a potent effect by itself Ferren's postproduction unit went in and enhanced it further with glows and flares.



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Variable-density grad mattes were used to produce soft-edge glow effects around Emily, as well as interactive lighting on walls and floors.

Once the end corridor sequence shifted from the physical to the metaphysical, it was decided, for consistency, that the tank room transformation also needed modification; and so Bran Ferren and his postproduction crew went back and optically enhanced those already approved shots, as well. Then it was determined that Blair Brown needed optical enhancement to better correlate with her scintillating co-star. Grad mattes were employed once again to produce a glowing effect around her front-projected cracked suit. "That was her 'cosmic fire,'" Ferren quipped. "Ken came up with that term. Originally we took the somewhat pedantic approach that if somebody's body is on

fire and they put their arm against a wall, then the wall should start burning. But Ken didn't want that. Hence, 'cosmic fire' — it's hot, but it doesn't burn anything. Anyway, to do that, we built up a series of grad mattes to put an aura around her — a sort of gaseous envelope to make her look hotter and a little more creepy. Then we brightened up her figure and took the room down a little bit. We also added a lot of little dumb mattes that no one in the world notices except me, so that when her hand gets near the wall, the wall gets brighter; and when she gets near Bill, he gets redder; and when you see the floor reflections, they match the color and intensity that they would if they were actually coming off her body. Basically, we just did anything we could to enhance things and make the situation a bit more credible, so you don't just see this figure glowing in a corridor with none of the environment reacting to it. We also changed the contrast around and added heat-ripple effects optically over the image and the glow without affecting the background, just to distort and diffuse it a bit and to increase the visible heat effect."

The end corridor sequence of Bill Hurt and Blair Brown transmuting, interacting, and reconstituting was, by far, Ferren's most difficult undertaking. Ninety seconds of film time required eight full months of virtual nonstop work. "That final corridor may not look like much," Ferren remarked, "but it was a mother! Unlike the other scenes where everything fell together, nothing in that scene fell together. Everything had to be beaten into submission, one at a time. But I'm of the school of thought that you don't cheat when you're doing effects. When you have a transition happening to a character, you don't show him in one stage, cut away to something else, and then cut back to him in another stage. When we cut away in the corridor and he's in one of his stages of transformation, when you come back, he's right where he left off — unless, of course, there's a major jump in time that precludes it. That makes for a lot more work. Rather than ending up with a collection of separate shots, you end up with maybe fifteen transitions that leap-frog one into the other. That's what the whole end sequence is all about.

"I thought of dissolves, but I favored fast cutting. There are moments when Bill is back for one frame as himself, then returns for three frames — fractions of a second. The problem with that was that none of it was matched footage. You're looking at two different body suits, different



Dick Smith's cracked suit, with front-projected "lava" and grad matte glow.

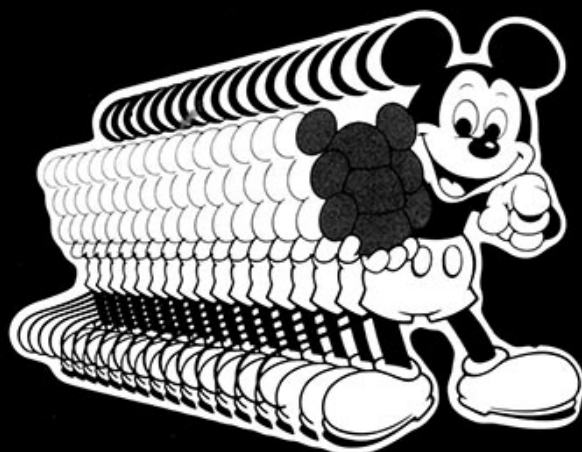
geometries where you're not seeing the suit at all but just the images around the suit, live footage of him banging back and forth — and none of it's coordinated. All of it's non-locked camera movement, which anyone in his right mind will tell you makes it impossible to intercut. So I took that dare, doing dynamic repositions, flips, rotations, changes in color and density, in order to get it all to work. In one scene where he's moving back and forth, there are eleven pieces of film all strung together, none of which match each other. If you look at it frame-by-frame, it's a big jumbled mess. But it was dynamically taking advantage of the viewer's perception to guide him through it, rather than what's physically on the film."

While the special visual effects speak for themselves, no one is more justified in footnoting the schizoid filming of *Altered States* than Dick Smith. "I really didn't mind the optical enhancements," he said. "I'm sure what happened was that when they put the end sequence together, it was just too dull. It needed something that suggested energy and color and excitement. So that I agree with entirely — if you're going to use latex suits, by all means enhance them. What disappointed me is that they weren't used as they were originally designed. The Number One suit in the hallway with one arm missing doesn't even make sense. And the Number Three suit used in the tank room sequence, with this misshapen blob wrapped around his head — what does it all mean? Looking at the three suits in their proper sequence, you can see the progressive mutation and understand the stages of Jessup's deterioration. Out of context, it's meaningless! It's an interesting form, but that's all. All the concept has gone out of it. If the tank room scene had been done as originally conceived, and optically enhanced, I would have been delighted. But as it was, I was heartbroken.

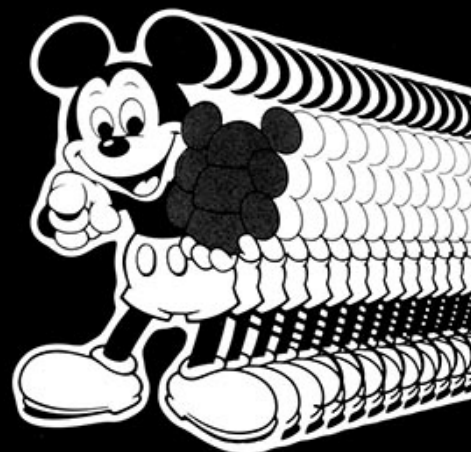
"In this business, as a makeup artist, it's only once or twice in maybe ten years that a job comes along that's really unusual, or of any magnitude. In my own case, I consider perhaps *The Exorcist* as the top creative thing that I've done. Since then, I really haven't had the chance to do anything that was that good. So when *Altered States* came along, I looked at it as another one of those rare opportunities to do something really great. And when you put that all-out kind of effort into a job, it's terribly disappointing to feel later on that your work was wasted. It's okay if you're young and have a long career ahead of you, but I'm very much aware that my time is running out. I've already turned down several big jobs this year that I didn't think were worth the supreme effort of killing myself over. It takes that; and quite honestly, I don't know how much longer I can expect to be able to have the energy that's necessary for this kind of sustained creative effort. I just hope that sometime I will have that chance, once again, to do some really unusual and memorable makeup."

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